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An exploratory analysis of the northern Gulf of St. Lawrence (3Pn4RS) Atlantic cod (*Gadus morhua*) tagging database

Analyse exploratoire de la base de données du marquage de la morue (*Gadus morhua*) du nord du Golfe du Saint-Laurent (3Pn4RS)

John Brattey and Brian Healey

Science Oceans and Environment Branch
Fisheries and Oceans
P. O. Box 5667
St. John's, NL Canada A1C 5X1

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Abstract

This document summarizes exploratory analysis of the northern Gulf of St. Lawrence cod (*Gadus morhua*) tagging database which contains information from about 44,500 releases and 2,371 (5.2%) reported recaptures of cod tagged and released in 3Pn4RS during 1995-2003. Recent catch data from 3Pn4RS cod are summarized to aid in the interpretation of tag returns; reported landings ranged from 3,100 to 6,930 t during 1997-2002. We provide some summaries of the tagging data along with suggestions on how the northern Gulf of St. Lawrence cod tagging study could be improved. The overall return rate of tagged cod is low and there is a strong seasonal pattern in the recovery rate depending on the time of release. Return rates (median percentage returned) was substantially lower (1-2%) for cod tagged in summer (July-September) when surface temperatures could be extremely warm, compared to those tagged during the cooler spring months (6-7%, April-May). There were many experiments with no recaptures and these included several with >100 releases, suggesting that initial tagging mortality was extremely high in some of the experiments; this contrasts with the results of a small number of experiments where tagged cod were held in submersible cages which showed high survival (≥ 82%). Over 2,000 double-tagged cod were released, but the low overall return rate resulted in too few recoveries (215 over 8 yrs) to estimate the parameters of the Kirkwood tag loss model which has been shown to adequately describe the rate of loss of t-bar anchor tags in cod. However, annual grouping of the recapture data from double tagged cod suggested that the rate of loss was not inconsistent with that reported for cod tagged in the adjacent 3Ps stock area. Data from one experiment involving simultaneous release of single-tagged and high-reward tagged cod provided a reporting rate estimate for single tagged cod of 0.38 for 2001. Annual exploitation rates calculated using the methods described by Brattey and Healey (2003) suggest high exploitation rates for cod tagged in some areas, notably 3Pn (typically 12-23% harvested per year), 4Rc (12-18%), 4Rb (5.4-18.7%), but low (4Sw) or variable rates elsewhere (4Ra, 4Rd). These estimates have considerable uncertainty because of the sparseness of the data available to estimate initial tagging mortality, tag loss, and tag reporting rate. The study could be improved by more rigorous training of fishers involved in tagging, combined with simultaneous release of batches of cod with single, double, and high reward tags at several sites throughout the stock area. Much higher proportions of double tags should be used (40%). Cage experiments to monitor initial tagging mortality should be repeated over a wider range of conditions and by the same individuals conducting the field tagging.

Résumé

Ce document présente un résumé de l'analyse exploratoire de la base de données du marquage de la morue (*Gadus morhua*) du nord du golfe du Saint-Laurent qui contient des données sur environ 44 500 morues marquées et 2 371 (5,2 %) recaptures déclarées de morues marquées et relâchées dans 3Pn4RS entre 1995 et 2003. Nous résumons des données récentes de captures de morues dans 3Pn4RS afin de faciliter l'interprétation des données de recapture. De 1997 à 2002, les débarquements déclarés se sont chiffrés entre 3 100 et 6 930 t. Nous présentons certains résumés des données de marquage ainsi que des suggestions pour améliorer l'étude de marquage de la morue du nord du golfe du Saint-Laurent. Le taux global de recapture de morues marquées est bas et il varie grandement en fonction des saisons, selon le moment du marquage. Le taux de recapture (médiane du pourcentage de retours) a été considérablement plus bas (de 1 à 2 %) pour les morues marquées en été (entre juillet et septembre), période où la température en surface peut être très élevée, que pour les morues marquées au printemps (de 6 à 7 %, en avril ou mai). Aucune morue n'a été recapturée dans nombre d'expériences, dont plusieurs comptaient plus de 100 poissons marqués, ce qui suggère que la mortalité initiale due au marquage était extrêmement élevée dans certaines expériences. Ces résultats contrastent avec ceux d'un petit nombre d'expériences au cours desquelles des morues marquées ont été placées dans des cages submersibles et le taux de survie de ces morues a été élevé (≥ 82 %). Plus de 2 000 morues à marques doubles ont été remises à l'eau, mais le faible taux global de recapture (215 recaptures en 8 ans) a fait en sorte qu'il a été impossible d'estimer les paramètres du modèle de perte de marques de Kirkwood, dont l'efficacité à décrire le taux de perte de marques à ancrage en T chez la morue a été démontrée. Cependant, le groupement par année des données de recapture de morues à marques doubles a suggéré que le taux de perte de marques était compatible avec celui observé dans la zone 3Ps adjacente. Les données d'une expérience portant sur la remise à l'eau simultanée de morues à marque simple et à marque à récompense élevée ont permis d'estimer un taux de déclaration des prises de morues à marque simple de 0,38 pour 2001. Les taux d'exploitation annuels calculés à l'aide des méthodes décrites par Brattey et Healey (2003) sont élevés pour les morues marquées dans certaines zones, notamment 3Pn (habituellement de 12 à 23 % par année), 4Rc (de 12 à 18 %), 4Rb (de 5,4 à 18,7 %), mais faibles (4Sw) ou variables ailleurs (4Ra et 4Rd). Une grande incertitude est liée à ces estimations en raison du nombre peu élevé de données disponibles pour estimer les taux de mortalité initiale due au marquage, de perte de marques et de déclaration des prises. L'étude pourrait être améliorée par une formation plus rigoureuse des pêcheurs qui participent au marquage et en libérant simultanément des lots de morues à marques simples, doubles et à marques à récompense élevée, à plusieurs sites dans l'ensemble de la zone du stock. Beaucoup plus de marques doubles devraient être utilisées (40 %). Les expériences en cage pour surveiller la mortalité initiale due au marquage devraient être répétées dans une vaste gamme de conditions par les mêmes personnes qui effectuent le marquage.

Introduction

This document summarizes exploratory analysis of the northern Gulf of St. Lawrence cod tagging database and investigates whether the data could be used to estimate exploitation rates. This database comprises information on cod tagged in 3Pn4Rs during 1995-2003 . The data collected up to July 2000 have undergone some preliminary analysis to investigate mixing with cod in Subdiv. 3Ps (Bérubé and Fréchet 2001). However, there have been no detailed quantitative analyses of the northern Gulf of St. Lawrence cod tagging data. Here we examined the database along with additional information from field studies to determine whether we could produce reasonable estimates of important tagging parameters, i.e. tagging mortality, tag loss, and reporting rates, and thereby estimate annual exploitation rates. Recent catch data from 3Pn4RS cod are summarized briefly to aid in the interpretation of tag returns. We also provide some summaries of the recaptures from the cod tagging study and discuss limitations in analyzing the data. Suggestions on how the study could be improved are also given. Data from tagging experiments conducted in the northern Gulf of St. Lawrence prior to 1995 are summarized elsewhere (Minet 1975, 1977; Gascon et al. 1990; Moguedet 1994; Taggart et al. 1995; Gagnon 1996).

Materials and Methods

Details of the methods used to tag and release fish in 3Pn4RS are given in Bérubé and Fréchet (2001). Most of the tagging was conducted by fishers who were provided with protocols and training in tagging methodology. The fish were tagged with Floy t-bar anchor tags inserted at the base of the first dorsal fin. Cod for tagging were caught with various gears (mostly hand-line and long-line, with some otter trawl and cod-trap). The tags were mostly yellow or orange in colour and bore a unique serial number and return address. Fishers were encouraged to return tags by a well-advertised lottery system, although some high-reward ($100) tags were released in 2000 and 2001. A $10 reward for all regular tags has been in effect since 2001.

A copy of the northern Gulf of St. Lawrence cod tagging database was provided to us in Microsoft (MS) Access97 format; this was converted to a MS Excel file with one record per tagged fish. After various error checks and editing, the database consisted of 59,525 records. After removing records where the length at tagging was <40 cm, and those where the release length, year of tagging, area of release, depth of release, or capture latitude and capture longitude were not known there were 44,524 records. For ease of analysis, all available variables were reformatted to be consistent with those used in analysis of the cod tagging database held at by the Groundfish Section of DFO in St. John's, NL. There were no experiment numbers in the northern Gulf of St. Lawrence cod tagging database and these were assigned by grouping cod caught in the same year, unit area, month, and capture gear, provided the longitude did not change by more than 0.5°(decimal), or the longitude by 0.75°(decimal), and the depth did not change by more than 150 m. Experiment numbers were assigned using year of release and sequential 3-digit numbers beginning at 001 each year.

Data analysis

For many of the analyses data was grouped by unit area (see Fig. 1). The methods used to compute exploitation rates are described in detail in Brattey and Healey (2003). As in previous analyses of cod

tagging data from Subdiv. 3Ps (Brattey and Healey 2003), we did not attempt to estimate population sizes using tag returns and commercial catches in this analysis, because typically some harvesting occurs in an area different from where fish were tagged; this makes it difficult to convert local catches to local population biomass. Initially we explored the available data for information on three important tagging parameters, namely initial tagging mortality, the rate of tag loss, and rate at which tags are reported. We also provide some simple summaries of the available data to show how the distribution of recaptures is affected by factors such as year, month, area, tag type, and depth.

Initial tagging mortality

Information on tagging mortality is particularly important to obtain in tagging studies. If a significant portion of cod die due to the stress of capture, handling, tagging, and release, then there may be substantially fewer tagged cod available for subsequent recapture; if these losses are not accounted for this can result in a significant negative bias in the estimates of exploitation rate. Estimates of initial tagging mortality (τ) were obtained from various sources. Brattey and Cadigan (2004) explored tagging mortality among 3Ps cod by retaining batches of tagged cod in submersible enclosures at various times of year and monitoring their survival. This analysis showed a significant seasonal tagging mortality effect which appears to be related to water temperature. Tagging mortality among cod > 45 cm was low (0.03) during spring and higher (0.25) during late summer and fall (August-November). Seasonal estimates of tagging mortality (τ) were obtained from this analysis based on the month of release of tagged cod; values of 0.03 used for cod tagged in December-June and 0.25 for cod tagged in July-November. In addition, the cod in the survival experiments in 3Ps were tagged by the same two individuals who conducted most (~65%) of the field tagging experiments in 3Ps. Brattey and Cadigan (2004) also found no evidence of differences in return rate among cod caught for tagging with different gears (hand-line versus line-trawl, cod trap, and otter trawl) at depths <200m.

Reporting rates

There are three sources of information available to estimate the fraction of tags found that are actually returned. The first is based on a high-reward tagging study, described in detail in Cadigan and Brattey (2003) and updated with recent recaptures from cod released in 3Ps, but recaptured in 3Pn4RS. The second estimate is based on the same method, but uses data from single, double, and high-reward tags released in one experiments conducted in 3Pn4RS during 2001. The third is based on a questionnaire conducted by the Fish Food and Allied Workers Union (FFAW) in 2002, the results of which were presented at the Zonal Assessment Meeting in March 2003.

Tag loss rates

In the 3Ps cod tagging study, tag retention rates (ϕ) were estimated from a double-tagging study (see Cadigan and Brattey 2003), which showed that tag loss mostly occurred in the first 3-4 months after release with only minimal losses (1-2% per year) thereafter. The model proposed by Kirkwood (1981) was used to estimate tag loss rates

$$\phi_t = ((\beta_0/(\beta_0 + \beta_1 t))^{\beta 0}; \ \beta_0, \beta_1 \geq 0$$

where t is the time at liberty. Cadigan and Brattey (2003) show that this model is more suitable than the proportional tag loss model proposed by Barrowman and Myers (1996).

Cadigan and Brattey (2003) also found that the rate of loss of tags depends on position and that the front tag of a double tagged fish is lost at a faster rate than the back tag; thus, there are three types of recapture from a double tagged fish: (the front tag only, the back tag only, or both tags). The tag loss model was used to compute the proportion of initial number of tags applied that were retained at the median date of recapture for each recapture year. This was done separately for each type of tag return. In the 3Ps/3KL cod study, over 2,600 recaptures from double tagged fish released over a three year period and recaptured during 1997-2003 were available to estimate tag loss rates. We attempted a similar analysis using returns of double-tagged cod released in the 3Pn4RS cod tagging study.

Estimation of exploitation rates

To estimate exploitation annually, we tracked the numbers of fish available for capture in each year, accounting for tag loss and assumed natural mortality. The recaptures from each region (R) were adjusted by the estimated reporting rate; most of the 3Pn4RS releases were recaptured within this area. Thus the reporting rate estimate from the northern Gulf high-reward tagging data was used (see Results). In the year of release, we immediately removed those cod that die "instantly" due to tagging mortality (τ). The estimates of loss are computed from estimated retention rates (ϕ) using Kirkwood's model and apportioned by the time at liberty. For each recapture year and tagging experiment, a time at liberty was computed, which in the first year corresponds to the number of weeks between the median date of release of tagged fish and the median recapture date of tagged individuals in the year of release. For subsequent years, time at liberty (w) is calculated by incrementing the number of weeks between the annual median dates of recapture. Natural mortality (m) was also apportioned by the time-at-liberty, i.e. $e^{-m(w/52)}$ and m was assumed to be 0.4 per year, i.e. the value assumed in recent assessments of northern Gulf cod (Fréchet et al. 2003). Some analyses were also run with m at 0.2 per year. The methods used to keep track of the numbers of each tag type available for capture in the year of release and subsequent years are described in Brattey and Healey (2003)

The exploitation rate $\mu(t)$ in year t for each experiment is estimated by summing the adjusted number of recaptures across tag types and dividing by the summed numbers of each tag type available to the fishery, i.e.:

$$\mu(t) = \frac{\sum_k R^*_{t(k)}}{\sum_k M(t)_{eff(k)}}.$$

The subscript k represents available tag types at time t. $M_{eff(k)}$ is the number of type k tags available at the time of the fishery in each year. R^* is the number of reported recaptures adjusted by the reporting rate. Note that the annual median time at liberty is common across tag types within an experiment. Tagging experiments were conducted in consecutive years in some locations; thus multiple annual estimates of exploitation are given for some locations. Note that in many northern Gulf tagging experiments tagged fish were released during the fishery and the first estimate of exploitation for these releases accounts for only a portion of the total exploitation in that year. Also the tagged cod are unlikely to have dispersed widely soon after release which means the results for the year of release may have some negative or positive bias, depending on the dispersal behaviour of the fish and whether they were released in a heavily or lightly fished area.

Results

Spatial and temporal distribution of cod landings

Reported annual landings of cod from various unit areas in 3Pn4RS for 1997-2003 are summarized in Table 1 and Fig. 2 Total reported landings during 1997-2002 ranged from 3,100 t in 1998 to about 6,900 t in 2001. Reported landings were similar during 1999-2002 (6,500-6,900). The directed cod fishery was closed in 2003 and reported landings from by-catch and sentinel fisheries totaled only 276 t.

Landings have been well spread throughout the stock area, except in the more westerly unit areas of NAFO Div. 4S which typically have combined annual landings of less than 250 t (Table 1). Unit areas 4Rb, 4Ra and 3Pn have typically accounted for most of the landings, with 500-1,500 t reported annually from each of these unit areas in most years. Overall, the spatial distribution of landings has been similar with about 20% of the catch taken in each of 3Pn, 4Rb, and 4Rc and about 10% in 4Rd, 4Rc, and 4Sw. Excluding the 2003 landings, there is a slight trend toward higher landings in 3Pn and lower landings in 4Rd.

Monthly landings for the 2002 calendar year are summarized in Table 2. Most of the catch in the more northerly unit areas (4Rb, 4Ra, 4S) was taken in July and August, whereas the catch in the southerly areas (3Pn and 4Rd) was taken in the summer and fall (July-November) with highest monthly landings in October.

Release information

The number of fish tagged annually in each region of the northern Gulf is summarized in Table 3. Tagging has generally been well spread throughout the stock area, particularly during 1996 and 1999-2002, but less so during 1995 and 1998. Most tags have been applied in 3Pn (17,144) followed by 4Ra (9,597) and 4S (7,174 for all unit areas combined). Tagging was continued in 3Pn and 4Rd in 2003 in spite of the closure of the directed cod fishery. There have also been small numbers of tags applied (191 and 71) in adjacent stock areas (3Ka and 3Psa, respectively).

The time of year that cod were tagged has varied by unit area and largely reflects the seasonal availability of cod throughout the stock area (Table 4). In 3Pn, some tagging has been conducted throughout April-December, but most tags have been applied in spring (April-May) and fall (October-December). In contrast, most tagging has been conducted during summer and early fall (June-October) in other areas (4Rc, 4Rb, 4Ra, and 4S). Note that much of the tagging has been conducted during the warmer summer months, often while the fishery was still in progress; the exception is in 3Pn where tagged cod have often been released in April-May which in some years was 1-2 months before the directed cod fishery opened.

Most cod (93%) have been tagged with single spaghetti t-bar anchor tags (Table 5). Double tags were also applied to about 5% of the tagged cod in most years. A total of 482 high reward ($100) tags were available in this analysis, but these were applied only in 2000 (212) and 2001 (270).

Recapture information

The annual numbers of recaptures from releases in each year is summarized in Table 6. Numbers tagged and reported landings have varied considerably during 1995-2003; consequently annual recaptures are quite variable. The data in Table 6 show that from the earliest releases recaptures extend over at least five years after release. The total number of recaptures has tended to increase over the past four years, from 179 in 1998 to 659 in 2002, mainly because the size of the tagged "population" available for capture has increased each year. The dramatic reduction in recaptures in 2003 reflects closure of the directed cod fishery.

The number of recaptures from each region is summarized in Table 7. The majority of recaptures (913) have come from Subdiv. 3Pn (where most cod were tagged, see Tables 3 and 4), followed by similar numbers of returns from the four unit areas in 4R. There have been few recaptures from within 4S in spite of the substantial numbers of fish tagged, notably in the warmer summer months (July-September); many of the fish tagged in this region may have died and not been available for subsequent recapture. There have been many recaptures (227) from inshore unit areas in 3Ps (3Psa/b/c) most notably from releases in 1996; only 6 cod tagged in the northern Gulf have been reported from offshore areas of 3Ps east and south of Burgeo (3Pse/f/g/h).

Recaptures by tag type are summarized in Table 8, with 2,371 of the single tags (5.6%), 215 of the doubles (8.6%), and 77 (16%) of the high-reward tags reported as recaptured.

A synopsis of details for the northern Gulf of St. Lawrence cod tagging data, based on assigned experiment numbers, is given in Table 9. There is a total of 197 tagging experiments with >25 tagged cod in the database; experiments with <25 releases are not shown. Thirty two (16.2%) of these 197 experiments had no recaptures; most of these are experiments with relatively small numbers of releases (<50), but there were some with larger numbers (>100) of releases (i.e. experiment #'s 1998-024, 1998-028, 1998-050, 1999-054, 2000-045, 2001-012, 2001-029). In unit area 4Sy there were no returns from over 600 tagged cod. This suggests high tagging mortality in some of the tagging experiments. In 30 (15.2%) of the experiments listed in Table 9 more than 10% of the tagged cod were subsequently reported as recaptured.

The median percentage recaptured from each experiment is also plotted by month of release (Fig. 3). Although there are fewer experiments conducted in spring, the comparison suggests that substantially fewer tagged cod are subsequently recaptured when the fish are released during the warmer months. The median percentages for April-June are substantially higher (5-6%) than those for July-October (1-2%); this likely reflects higher tagging mortality when surface water temperatures are warm in summer and early fall.

A summary of the annual numbers of recaptures from each tagging experiment (all tag types combined) is given in Table 10, with experiments grouped by unit area of release. Most of the experiments had small numbers of returns (<10) each year and the numbers tended to be highest in the year of release or subsequent year. Note that many of the experiments were conducted during the fishing season and so experienced only a portion of the fishery in that year. Most of the experiments with large numbers of releases and returns were conducted in 3Pn in early spring (April-May) or later in the fall (October).

Initial tagging mortality

In the northern Gulf cod stock area, two sets of survival experiments have been conducted using tagged cod retained in submersible enclosures (J. Spingle, pers. comm); one in L'Anse au Loup Bay in September 1999 using 40 cod, and two in NAFO Div. 4S in August and September 2000 using 40 and 11 cod. Both experiments also had untagged controls. The 1999 experiments gave 100% survival (at temperatures < 6°C) and the 2000 experiments had survival rates of 90% and 82% (at temperatures of approximately 14°C and 9°C). The results indicate somewhat higher survival rates than those for comparable experiments conducted in 3Ps, although they are based on substantially smaller numbers of cage-held cod.

Reporting rates

From the high-reward tagging study of cod in 3Ps it was possible to estimate the reporting rate for the northern Gulf area using recaptures from 3Pn4RS. Using these data, the estimate of reporting rate for 3Ps-tagged cod recaptured in 3Pn4RS was 0.52 (1997-2003 recaptures combined).

From the high–reward tagging study conducted within the northern Gulf during 2001, the estimate of reporting rate was 0.38. The reporting rates estimated from the questionnaire prepared by the FFAW were 59% for 4R and 73% for 3Pn (averaged for 1999-2002). We suspect that the questionnaire estimates will have a positive bias given that only about half the questionnaires were returned. The results from the 3Ps high-reward tag analyses are nonetheless reasonably similar.

Tag loss rates

We attempted to analyse tag loss rates using in the northern Gulf cod tagging study using the methods described by Cadigan and Brattey (2003). In the northern Gulf, approximately 5% of the cod were initially tagged with double tags, but there were only about 215 recaptures from double tagged fish. The numbers returned and annual percentages that have lost a tag are summarized below:

Years at liberty	0	1	2	3
Total recaptures	89	78	36	8
% lost one tag	12	19	19	25

The raw data show that about 12% of double-tagged cod had lost a tag during the first year and about 20% by the end of the second year at liberty. Unfortunately, there were very few recaptures at > 2 years at liberty and overall the data were too sparse to fit the Kirkwood model, particularly when attempting to calculate separate loss rates for front and back tags. However, when the data in the table above are compared to Fig. 4 (which shows Kirkwood model loss rates for the front and back tag of double tagged cod in 3Ps/3KL) the results generally fall between the two lines; this suggests that tag loss rates for northern Gulf cod that are not inconsistent with those for cod tagged in 3Ps/3KL. Hence, from the available data it did not seem unreasonable to use the Kirkwood tag loss rate estimates from 3Ps to predict the number of tags retained over time for cod tagged in the northern Gulf. The estimates for the Kirkwood model parameters for single (front) tags were β_0=0.058 and β_1=0.068. However, we emphasis it would be prudent to conduct much more extensive double tagging of northern Gulf cod as well as record the initials of the individuals applying the tags. This would permit more detailed analyses of overall tag loss rates as well as analyses of the effect of different individuals applying tags.

Exploitation estimates

Estimates of annual exploitation (expressed as % of available numbers harvested) for each tagging experiment conducted since 2000 are summarized and grouped by unit area of release in Table 11; we did not attempt to estimate exploitation for experiments prior to 2000; we also assumed that reporting rates did not change between 2000 and 2002. Tagging has been conducted at many locations in some unit areas; consequently, there are multiple estimates of exploitation for some areas. Values for 2003 for all experiments tend to be much lower as the directed cod fishery was closed and reported landings were greatly reduced from preceding years. Note that the estimates in Table 11 do not reflect exploitation only from within the area of release; they reflect combined exploitation from all areas that generated recaptures from each experiment. The estimates using m=0.4 are predictably somewhat higher than those where m=0.2, since for longer times at liberty the higher assumed value of m reduces the available tagged population substantially.

For cod tagged in 3Pn, the estimates of annual exploitation are high even at m of 0.2, ranging from 9.9 to 23% in 2001 and from 7.2 to 40% in 2002 (excluding estimates for experiments conducted during the fishing season). The averages for 3Pn in 2001 and 2002 are approximately 15-18% from total reported landings of under 7,000 t in each of these years. The estimates for cod tagged in 4Rc and 4Rb are broadly similar to those for 3Pn, whereas the estimates for 4Ra and 4Sw are substantially lower, and those for 4Rd are highly variable.

Spatial and temporal distribution of recaptures

Annual summaries of the distribution of recaptures, grouped by unit area and year of release, are given in Table 12. For releases in most unit areas, over 50% of the returns come from within the area of release; however, many recaptures are quite well spread throughout the stock area even within the year of release. Cod tagged in 4S appear to show less dispersal, with most returns from within 4S and neighbouring 4Ra.

Discussion

In our exploratory analysis of the northern Gulf cod tagging database we have attempted to produce some annual estimates of exploitation rate from the data using the methods described by Brattey and Healey (2003). For the northern Gulf cod tagging program the overall return rate of tags is quite low and the information available to estimate tagging mortality, tag loss and reporting rates is quite sparse; consequently, our estimates of these parameters have considerable uncertainty. Our main concern is with estimates of initial tagging mortality, particularly for cod tagged in the warmer summer months which includes most of the cod tagged in 4R and 4S. Brattey and Cadigan (2004) found much higher tagging mortality (25%) among cod tagged in summer and fall off the south and northeast coast of Newfoundland. Water temperatures in the Gulf during summer and fall can be substantially higher, which could result in much higher mortality. The lower rates of return for northern Gulf cod tagged in the warmer months and the presence of experiments with quite high numbers of releases, but no subsequent recaptures, suggests that initial tagging mortality may be very high in some experiments. The tagged cod survival experiments show high survival, but these may have been conducted by relatively few individuals who may have been more careful compared to some of the fishers that have conducted the tagging. Given that a large number of different individuals are conducting the tagging, it is important that in subsequent analysis the tagger is recorded in the database so that tagger effects can be quantified in subsequent analyses. It may be more prudent to have a small number of individuals in each region conducting tagging to minimize tagger effects as a source of variability.

Release of double tagged cod is an important component of quantitative tagging studies and provides information to evaluate tag loss rates. Our exploratory analysis suggests that the fraction of tagged fish that were given two tags was too small to evaluate tag loss rates effectively, particularly with the low overall return rates. In future, we would recommend that about 40% of the cod be tagged with double tags for at least a couple of years and that double tags be applied by all individuals conducting tagging. The double tags should be appliedand recorded in a manner that allows them to be distinguished and the position of the returned tag should be recorded in subsequent tagging experiments, given that front and back tags have a different loss rate (Cadigan and Brattey 2004).

We have not been able to estimate reporting rates annually or assess how they may vary regionally within 3Pn4RS from the high-reward tag returns because the usable data were restricted to a single experiment conducted in 3Pn in 2001. Nonetheless, this experiment has proven extremely valuable and suggests that reward values have a considerable influence on the fishers willingness to return tags. We note that the estimate from this experiment is quite low relative to estimates for 3Ps, but is broadly consistent with the 3Pn4RS estimate from the Cadigan and Brattey (2003) study. Simultaneous release of cod with single, double and high-reward tags at several sites throughout the stock area would greatly improve the estimates of reporting rate.

It remains difficult to assess the validity of the assumption of a natural mortality rate of 0.4 per year for northern Gulf cod. However, as the time at liberty for tagged cod extends to several years the tagging data should provide some information about the validity of this assumption. If substantial numbers of returns come in after the tagged population is estimated to have declined to zero this may indicate that the assumed m is too high. Assumptions about m are confounded with the parameter for initial tagging mortality, so it is also important to conduct many more cage retention experiments over a wider range of environmental conditions, depths and capture gears. The tagging in such experiments should be conducted by individuals performing the mark/recapture experiments. The large number of very small cod that have been tagged that were omitted from the current analyses suggests that some taggers were

not following the protocols closely and are tagging fish that are too small, particularly during the early years of the tagging study (1995 and 1996).

We emphasize that the estimates we have produced for annual exploitation rates have considerable uncertainty. The data available from the northern Gulf study was too sparse to estimate some of the parameters required to estimate exploitation rates and we had to assume that some the values from the 3Ps tagging study could be applied here. However, within most unit areas of release the estimates of exploitation rate are broadly coherent among tagging experiments. The estimates for 3Pn in particular, as well as 4Rb and 4Rc, are high given the relatively small reported catches from the stock in 2000-2002 of around 6,500 t per year. For quantitative analysis, the study could be improved by more rigorous training of fishers involved in tagging, combined with simultaneous release of batches of cod with single, double, and high reward tags at several sites throughout the stock area. Much higher proportions of double tags should be used (40%) and cage experiments to monitor initial tagging mortality should be repeated over a wider range of conditions and by the same individuals conducting the field tagging.

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Table 1. Annual reported landings of cod from 3Pn4RS during 1997-2003

Year	3PN	4Rd	4Rc	4Rb	4Ra	4Sv	4Sw	4Sxyz	Totals
1997	2,005.8	299.0	593.4	600.2	805.8	140.6	327.3	19.7	4,791.8
1998	870.1	635.8	281.3	366.6	386.5	60.6	476.3	33.2	3,110.6
1999	1,164.6	944.0	908.2	1,478.1	1,551.3	123.9	632.0	88.3	6,890.4
2000	1,478.5	800.1	728.4	1,438.8	1,215.0	179.6	660.1	139.9	6,640.3
2001	1,739.6	717.0	995.4	1,268.8	1,310.4	252.4	569.6	80.5	6,933.6
2002	1,712.8	590.8	794.9	1,376.5	1,172.3	123.1	686.1	69.4	6,526.0
2003	34.9	59.1	14.0	55.4	20.5	19.4	60.1	12.7	276.0

Table 2. Reported monthly landings of cod (in metric tons) from 3Pn4RS by unit area during 2002.

	3Pn	4Rd	4Rc	4Rb	4Ra	4S
Jan	0.6	0.0	0.0	0.0	0.0	0.0
Feb	167.1	0.0	0.0	0.0	0.0	0.0
Mar	5.6	0.0	0.0	0.0	0.0	0.0
Apr	6.9	0.0	0.0	0.2	0.0	2.9
May	105.2	28.5	2.4	5.6	3.5	27.2
Jun	3.2	15.4	5.2	7.6	10.1	13.9
Jul	191.5	124.7	512.5	632.9	488.3	557.3
Aug	166.5	87.1	152.0	354.9	519.4	207.9
Sep	174.8	110.6	87.7	273.8	141.0	63.7
Oct	586.3	142.7	23.7	91.0	9.9	3.9
Nov	298.5	81.7	11.5	10.5	0.0	1.9
Dec	6.6	0.0	0.0	0.0	0.2	0.0
Totals	1,712.8	590.8	794.9	1,376.5	1,172.3	878.7

Table 3. Numbers of cod (>40 cm) tagged and released in 3Pn4RS during 1995-2003.

Year/Area	3Psa	3Pn	4Rd	4Rc	4Rb	4Ra	3Ka	4S	Totals
1995	0	312	0	549	130	155	0	0	1,146
1996	175	3,858	715	913	1,148	2,558	71	1,133	10,571
1997	4	388	0	486	277	860	0	863	2,878
1998	0	176	0	0	0	299	0	2,325	2,800
1999	12	1,955	190	981	707	1,295	0	1,211	6,351
2000	0	2,898	605	613	718	1,437	0	784	7,055
2001	0	3,029	465	354	502	2,335	0	257	6,942
2002	0	3,404	173	450	182	658	0	601	5,468
2003	0	1,124	189	0	0	0	0	0	1,313
Totals	191	17,144	2,337	4,346	3,664	9,597	71	7,174	44,524

Table 4. Numbers of cod tagged and released in each unit area by month.

	3Psa	3Pn	4Rd	4Rc	4Rb	4Ra	4S	3Ka	Totals
Jan	4	0	0	0	0	0	0	0	4
Feb	0	11	0	0	0	0	0	0	11
Mar	0	0	0	0	0	0	0	0	0
Apr	0	1,408	0	0	0	0	0	0	1,408
May	0	4,110	0	1	0	0	0	0	4,111
Jun	0	409	96	1,203	283	733	20	0	2,744
Jul	0	151	292	819	502	2,758	1,102	32	5,656
Aug	0	481	41	954	773	2,536	3,860	33	8,678
Sep	0	724	189	574	1,023	2,267	2,074	6	6,857
Oct	0	3,600	965	758	1,061	1,303	118	0	7,805
Nov	120	4,629	738	37	22	0	0	0	5,546
Dec	67	1,621	16	0	0	0	0	0	1,704
Totals	191	17,144	2,337	4,346	3,664	9,597	7,174	71	44,524

Table 5. Numbers of cod tagged in 3Pn4RS by tag type.

Rel. year	Single	Double	High-reward
1995	1,146	0	0
1996	10,446	1,215	0
1997	2,846	32	0
1998	2,710	90	0
1999	5,822	529	0
2000	6,188	655	212
2001	6,085	587	270
2002	5,039	429	0
2003	1,255	58	0
Totals	41,537	2,505	482

Table 6. Summary of recaptures of cod tagged and released in 3Pn4RS during 1995-2003

Year released	Nos. tagged	Numbers reported recaptured/year								Totals
		1996	1997	1998	1999	2000	2001	2002	2003	
1995	1,146	16	17	7	5	3	1	0	0	49
1996	10,571	33	159	139	95	44	24	31	0	525
1997	2,878	.	29	28	34	15	11	4	1	122
1998	2,800	.	.	5	26	22	16	7	0	76
1999	6,351	.	.	.	134	140	99	46	2	421
2000	7,055	.	.	.	.	134	193	122	8	457
2001	6,942	.	.	.	.	.	151	221	19	391
2002	5,468	.	.	.	.	.	.	228	37	265
2003	1,313	.	.	.	.	.	.	.	7	7
Totals	44,524	49	205	179	294	358	495	659	74	2313

Table 7. Numbers of tagged cod reported as recapture by year and area from releases in 3Pn4RS during 1995-2003.

Recapture Year	Recapture region*											
	3Ps_off	3Psc	3Psb	3Psa	3Psd	3Pn	4Rd	4Rc	4Rb	4Ra	4S	4Tvn
1995	0	0	1	4	0	10	5	22	5	6	0	0
1996	5	37	22	38	7	228	41	46	52	43	2	1
1997	0	5	1	8	1	23	12	22	19	22	0	1
1998	0	0	0	0	0	21	0	2	5	23	1	0
1999	0	5	1	38	1	128	42	47	64	64	3	1
2000	0	6	2	28	2	149	66	74	63	47	0	0
2001	0	4	1	10	2	184	31	43	44	35	2	0
2002	1	1	1	13	6	168	10	17	30	7	0	0
2003	0	0	1	0	0	2	0	1	2	1	0	0
Totals	6	58	30	139	19	913	207	274	284	248	8	3

*145 recaptures with missing area

Table 8. Numbers of recaptures of tagged cod from releases in 3Pn4RS by tag type.

Release year	Reported recaptures		
	Single	Double	High-reward
1995	54	0	0
1996	568	6	0
1997	127	3	0
1998	76	4	0
1999	424	69	0
2000	458	69	13
2001	392	34	64
2002	265	30	0
2003	7	0	0
Totals	2,371	215	77

Table 9. Summary of details for northern Gulf cod (3Pn4RS) tagging experiments conducted during 1995-2003 (LLS=longline, FPN=cod trap, GNS=gill net, LHP=hand-line, OTB= otter trawl). Only experiments with >25 tagged cod released are shown.

Expt.	Release	Date of release		Position of release				Depth of capture		Gear	Mean length	Number	Number recap-	Percent recap-
				Latitude (dec.)		Longitude (dec.)								
number	area	min	max	min	max	min	max	min	max	type	(cm)	tagged	tured	tured
1995001	3PN	11-Nov-95	30-Nov-95	47.50	47.55	58.72	59.17	47	174	LLS	54.3	109	6	5.5
1995002	3PN	13-Nov-95	30-Nov-95	47.56	47.57	58.59	58.73	25	70	LLS	55.0	110	8	7.3
1995003	3PN	4-Dec-95	6-Dec-95	47.51	47.57	58.64	59.12	44	144	LLS	53.5	93	2	2.2
1995004	4RA	17-Jul-95	21-Jul-95	51.40	51.40	56.56	56.56	11	11	FPN	44.8	144	5	3.5
1995006	4RB	15-Sep-95	25-Sep-95	49.59	49.59	57.94	57.94	18	18	FPN	44.3	45	3	6.7
1995007	4RB	2-Oct-95	2-Oct-95	49.59	49.59	57.94	57.94	9	9	FPN	47.3	39	1	2.6
1995008	4RB	22-Sep-95	22-Sep-95	49.66	49.66	58.01	58.01	40	40	LLS	53.1	46	1	2.2
1995010	4RC	26-Sep-95	28-Sep-95	49.14	49.15	58.40	58.43	37	45	LLS	65.5	177	8	4.5
1995011	4RC	2-Oct-95	21-Oct-95	49.09	49.21	58.29	58.43	37	52	LLS	59.3	368	20	5.4
1996001	3KA	30-Jul-96	31-Jul-96	51.47	51.47	55.42	55.42	29	29	LLS	48.8	32	0	0.0
1996002	3KA	1-Aug-96	23-Aug-96	51.47	51.62	55.40	55.42	29	40	LLS	46.0	33	0	0.0
1996004	3PN	5-Aug-96	25-Aug-96	47.43	47.56	58.75	59.22	37	153	LLS	56.9	167	21	12.6
1996005	3PN	12-Aug-96	22-Aug-96	47.63	47.65	58.15	58.21	15	51	LLS	57.3	302	43	14.2
1996006	3PN	1-Sep-96	18-Sep-96	47.50	47.55	58.95	59.23	44	157	LLS	51.9	237	22	9.3
1996007	3PN	17-Sep-96	17-Sep-96	47.56	47.56	58.06	58.06	201	201	LLS	63.5	35	0	0.0
1996008	3PN	20-Sep-96	22-Sep-96	47.57	47.57	58.74	58.89	101	120	LLS	46.0	64	4	6.3
1996009	3PN	18-Sep-96	18-Sep-96	47.57	47.57	58.08	58.08	82	82	LLS	54.7	57	3	5.3
1996010	3PN	30-Sep-96	30-Sep-96	47.58	47.58	58.86	58.86	80	80	LLS	49.2	77	1	1.3
1996011	3PN	2-Sep-96	8-Sep-96	47.63	47.63	58.23	58.28	18	29	LLS	56.0	254	40	15.7
1996012	3PN	18-Oct-96	31-Oct-96	47.52	47.55	58.72	59.17	99	158	LLS	55.1	184	16	8.7
1996013	3PN	28-Oct-96	28-Oct-96	47.56	47.56	58.07	58.07	144	144	LLS	53.2	26	0	0.0
1996014	3PN	9-Oct-96	28-Oct-96	47.56	47.56	58.70	58.87	130	150	LLS	52.9	185	4	2.2
1996016	3PN	8-Oct-96	30-Oct-96	47.58	47.63	58.29	58.72	20	129	LLS	57.0	475	49	10.3
1996017	3PN	5-Nov-96	20-Nov-96	47.46	47.57	58.66	59.17	49	212	LLS	54.0	832	37	4.4
1996018	3PN	14-Nov-96	14-Nov-96	47.57	47.57	58.07	58.07	156	156	LLS	54.8	40	2	5.0
1996019	3PN	5-Nov-96	25-Nov-96	47.57	47.69	58.06	58.86	10	140	LLS	52.0	565	54	9.6
1996020	3PN	3-Dec-96	14-Dec-96	47.57	47.63	58.32	58.72	20	129	LLS	46.8	251	9	3.6
1996021	3PN	9-Oct-96	14-Oct-96	47.27	47.47	58.13	58.67	168	218	OTB	53.0	48	2	4.2
1996023	3PN	12-Oct-96	19-Oct-96	47.48	47.52	58.25	58.65	156	231	OTB	54.3	28	1	3.6
1996025	3PSA	6-Nov-96	23-Nov-96	47.53	47.55	57.67	57.68	30	95	OTB	52.3	108	6	5.6
1996026	3PSA	4-Dec-96	18-Dec-96	47.53	47.54	57.68	57.70	30	112	OTB	50.1	67	2	3.0
1996031	4RA	10-Sep-96	26-Sep-96	50.75	50.87	57.30	57.35	30	100	GNS	59.4	62	5	8.1
1996032	4RA	12-Aug-96	23-Aug-96	51.42	51.64	56.44	56.65	36	73	LHP	49.3	65	2	3.1
1996033	4RA	3-Sep-96	27-Sep-96	51.40	51.47	56.60	57.02	36	109	LHP	46.8	293	6	2.0
1996035	4RA	3-Aug-96	30-Aug-96	50.77	51.72	56.33	57.33	26	109	LLS	49.7	988	25	2.5
1996036	4RA	2-Sep-96	30-Sep-96	50.80	51.52	56.65	57.32	13	111	LLS	48.6	639	8	1.3
1996038	4RA	4-Sep-96	30-Sep-96	51.64	51.68	56.43	56.54	40	80	LLS	43.6	71	0	0.0
1996039	4RA	2-Oct-96	22-Oct-96	50.73	51.08	57.05	57.50	18	128	LLS	47.5	110	2	1.8
1996040	4RA	2-Oct-96	17-Oct-96	51.24	51.66	56.43	57.04	24	114	LLS	47.3	264	3	1.1
1996043	4RB	7-Oct-96	10-Oct-96	49.60	49.60	57.95	57.95	20	20	FPN	48.2	159	13	8.2
1996044	4RB	25-Aug-96	28-Aug-96	49.51	49.51	58.25	58.26	36	36	GNS	49.7	139	6	4.3
1996045	4RB	4-Sep-96	27-Sep-96	49.47	49.50	58.13	58.25	24	36	GNS	48.4	121	6	5.0
1996047	4RB	1-Aug-96	20-Aug-96	50.05	50.22	57.63	57.76	33	51	LLS	53.8	40	2	5.0
1996048	4RB	12-Sep-96	27-Sep-96	49.59	50.25	57.58	57.95	20	50	LLS	47.7	438	21	4.8
1996049	4RB	1-Oct-96	3-Oct-96	49.59	49.59	57.95	57.95	20	20	LLS	44.7	209	11	5.3
1996059	4RC	5-Aug-96	29-Aug-96	48.68	48.73	59.02	59.05	36	40	LLS	50.6	251	15	6.0
1996060	4RC	6-Aug-96	28-Aug-96	49.14	49.19	58.40	58.47	40	53	LLS	62.4	482	36	7.5
1996061	4RC	10-Sep-96	25-Sep-96	48.70	48.72	59.03	59.03	40	40	LLS	59.2	62	1	1.6
1996062	4RC	23-Oct-96	23-Oct-96	49.10	49.10	58.30	58.30	64	64	LLS	60.0	27	3	11.1
1996063	4RC	27-Nov-96	29-Nov-96	49.09	49.10	58.30	58.34	37	44	LLS	57.8	37	1	2.7
1996066	4RD	9-Sep-96	9-Sep-96	47.65	47.65	59.33	59.33	46	46	LLS	54.9	30	2	6.7
1996067	4RD	10-Sep-96	12-Sep-96	48.38	48.38	58.74	58.74	27	27	LLS	65.8	27	1	3.7
1996068	4RD	17-Sep-96	25-Sep-96	48.44	48.46	58.69	59.27	20	55	LLS	55.3	52	6	11.5
1996069	4RD	8-Oct-96	30-Oct-96	47.82	47.89	59.40	59.45	33	55	LLS	53.5	315	25	7.9
1996071	4RD	12-Nov-96	30-Nov-96	47.87	47.87	59.42	59.42	13	33	LLS	54.9	121	7	5.8
1996073	4RD	13-Oct-96	13-Oct-96	48.20	48.22	59.32	59.47	101	128	OTB	49.6	50	4	8.0
1996075	4RD	13-Oct-96	13-Oct-96	48.30	48.48	59.42	59.68	111	176	OTB	51.6	58	2	3.4
1996077	4SW	25-Aug-96	28-Aug-96	51.30	51.30	57.79	57.79	30	32	LHP	51.2	113	2	1.8
1996078	4SW	27-Aug-96	31-Aug-96	51.33	51.38	57.24	57.58	19	47	LHP	48.9	358	6	1.7
1996079	4SW	2-Sep-96	23-Sep-96	51.28	51.31	57.78	57.80	28	47	LHP	49.7	118	7	5.9
1996080	4SW	1-Sep-96	18-Sep-96	51.32	51.39	57.19	57.58	12	50	LHP	47.1	520	14	2.7

cont'd.-

Table 9. Details of northern Gulf cod tagging experiments (cont'd).

Expt. number	Release area	Date of release min	Date of release max	Position of release: Latitude (dec.) min	Latitude (dec.) max	Longitude (dec.) min	Longitude (dec.) max	Depth of capture min	Depth of capture max	Gear type	Mean length (cm)	Number tagged	Number recaptured	Percent recaptured
1997002	3PN	11-Jun-97	24-Jun-97	47.54	47.57	58.86	58.95	120	140	LLS	52.1	194	17	8.8
1997003	3PN	4-Nov-97	12-Nov-97	47.43	47.56	58.80	59.00	117	149	LLS	55.0	183	11	6.0
1997005	4RA	26-Aug-97	28-Aug-97	51.22	51.43	56.82	56.87	34	51	LLS	43.6	129	4	3.1
1997006	4RA	1-Sep-97	26-Sep-97	51.05	51.52	56.77	57.27	10	106	LLS	46.6	452	6	1.3
1997007	4RA	1-Oct-97	16-Oct-97	51.24	51.51	56.77	57.04	26	93	LLS	43.1	279	5	1.8
1997008	4RB	3-Sep-97	17-Sep-97	50.25	50.25	57.60	57.60	31	31	LLS	45.5	130	7	5.4
1997009	4RB	7-Oct-97	7-Oct-97	50.25	50.25	57.60	57.60	31	31	LLS	44.1	147	1	0.7
1997011	4RC	25-Jun-97	30-Jun-97	48.70	48.70	59.05	59.05	40	40	LLS	55.8	170	18	10.6
1997012	4RC	1-Jul-97	1-Jul-97	48.70	48.70	59.05	59.05	40	40	LLS	58.3	98	6	6.1
1997013	4RC	21-Aug-97	23-Aug-97	49.12	49.12	58.43	58.43	40	40	LLS	48.8	198	21	10.6
1997021	4SW	21-Jul-97	30-Jul-97	51.31	51.38	57.23	57.71	13	40	LHP	53.5	39	0	0.0
1997022	4SW	1-Aug-97	28-Aug-97	51.28	51.39	57.22	57.81	13	40	LHP	48.8	534	21	3.9
1997024	4SW	1-Sep-97	16-Sep-97	51.31	51.31	57.79	57.80	24	28	LHP	49.2	56	2	3.6
1997025	4SW	1-Sep-97	23-Sep-97	51.31	51.39	57.16	57.58	5	40	LHP	48.3	183	1	0.5
1998001	3PN	15-Dec-98	15-Dec-98	47.55	47.57	58.68	58.72	132	141	LHP	52.6	45	0	0.0
1998004	3PN	20-Nov-98	20-Nov-98	47.66	47.66	58.37	58.37	55	55	LLS	50.3	113	15	13.3
1998005	4RA	27-Aug-98	31-Aug-98	51.62	51.64	56.45	56.53	60	60	LHP	45.8	289	11	3.8
1998010	4SW	25-Jul-98	25-Jul-98	51.43	51.43	57.24	57.24	6	6	FPN	49.1	57	7	12.3
1998012	4SW	23-Jul-98	24-Jul-98	50.71	50.82	58.83	58.91	15	22	LHP	43.3	60	1	1.7
1998013	4SW	3-Jul-98	28-Jul-98	51.29	51.40	57.19	57.79	10	35	LHP	48.9	175	4	2.3
1998015	4SW	5-Aug-98	31-Aug-98	51.28	51.48	57.20	57.81	10	40	LHP	45.2	1137	22	1.9
1998016	4SW	7-Sep-98	10-Sep-98	51.31	51.32	57.29	57.30	45	45	LHP	44.3	52	0	0.0
1998018	4SW	1-Sep-98	11-Sep-98	51.33	51.48	57.23	57.64	14	40	LHP	45.9	464	10	2.2
1998024	4SY	6-Jul-98	15-Jul-98	49.72	49.83	62.77	63.23	161	198	OTB	48.0	181	0	0.0
1998028	4SY	7-Jul-98	7-Jul-98	50.07	50.08	64.70	64.85	134	153	OTB	51.8	51	0	0.0
1998030	4SY	7-Oct-98	7-Oct-98	50.05	50.07	64.50	64.72	156	166	OTB	46.9	40	0	0.0
1999001	3PN	5-May-99	30-May-99	47.53	47.61	58.38	59.23	25	137	LLS	53.8	313	36	11.5
1999002	3PN	1-Jun-99	14-Jun-99	47.53	47.65	58.38	59.18	55	137	LLS	50.9	185	12	6.5
1999003	3PN	4-Jul-99	21-Jul-99	47.56	47.68	58.20	58.86	55	120	LLS	52.4	145	19	13.1
1999004	3PN	21-Oct-99	22-Oct-99	47.52	47.57	58.85	59.16	73	126	LLS	54.1	467	50	10.7
1999005	3PN	28-Oct-99	28-Oct-99	47.61	47.61	58.19	58.19	120	120	LLS	53.9	66	9	13.6
1999006	3PN	6-Nov-99	24-Nov-99	47.53	47.57	58.80	59.13	73	117	LLS	54.7	745	47	6.3
1999007	3PN	10-Dec-99	10-Dec-99	47.61	47.61	58.25	58.25	140	140	LLS	49.7	34	1	2.9
1999011	4RA	23-Jun-99	29-Jun-99	51.26	51.65	56.38	56.88	30	80	LHP	53.1	391	31	7.9
1999012	4RA	10-Jul-99	28-Jul-99	51.11	51.68	56.43	57.17	32	70	LHP	49.7	134	5	3.7
1999014	4RA	1-Sep-99	30-Sep-99	51.36	51.66	56.38	56.96	25	82	LHP	47.9	321	6	1.9
1999015	4RA	1-Oct-99	1-Oct-99	51.40	51.40	57.03	57.03	27	27	LHP	48.4	45	0	0.0
1999016	4RA	27-Jun-99	30-Jun-99	50.75	51.26	56.78	57.35	56	90	LLS	54.8	260	27	10.4
1999017	4RA	9-Jul-99	9-Jul-99	51.27	51.47	56.39	56.92	30	46	OTB	52.5	91	5	5.5
1999019	4RB	25-Jun-99	28-Jun-99	49.37	49.61	57.98	58.24	10	35	LHP	53.9	164	10	6.1
1999020	4RB	23-Sep-99	27-Sep-99	50.28	50.28	57.60	57.60	46	46	LHP	55.5	149	12	8.1
1999021	4RB	22-Oct-99	23-Oct-99	50.25	50.25	57.60	57.60	33	33	LHP	54.2	86	4	4.7
1999022	4RB	10-Jun-99	26-Jun-99	50.23	50.34	57.56	57.61	18	60	LLS	55.0	222	14	6.3
1999024	4RB	8-Jul-99	8-Jul-99	49.79	50.38	57.64	58.11	55	179	OTB	51.7	170	11	6.5
1999026	4RB	18-Oct-99	18-Oct-99	50.41	50.59	57.54	57.59	123	187	OTB	52.0	64	3	4.7
1999027	4RC	24-Jun-99	27-Jun-99	48.64	48.64	59.12	59.12	52	52	LHP	54.0	162	17	10.5
1999028	4RC	29-Jun-99	29-Jun-99	49.14	49.14	58.41	58.41	38	38	LHP	54.9	74	16	21.6
1999029	4RC	14-Jul-99	14-Jul-99	48.64	48.64	59.12	59.12	52	52	LHP	48.2	58	6	10.3
1999030	4RC	28-Jul-99	28-Jul-99	49.14	49.14	58.41	58.41	38	40	LHP	56.5	119	24	20.2
1999032	4RC	28-Sep-99	30-Sep-99	48.70	48.70	59.05	59.05	46	46	LLS	55.2	101	10	9.9
1999033	4RC	2-Oct-99	2-Oct-99	48.70	48.70	59.05	59.05	46	46	LLS	57.9	120	12	10.0
1999034	4RC	7-Jul-99	7-Jul-99	48.84	48.97	59.06	59.27	48	90	OTB	49.9	102	2	2.0
1999035	4RC	8-Jul-99	8-Jul-99	49.04	49.29	59.05	59.24	125	275	OTB	50.5	80	2	2.5
1999036	4RD	28-Jun-99	28-Jun-99	47.82	47.82	59.43	59.43	53	53	LHP	52.2	31	0	0.0
1999038	4RD	16-Sep-99	29-Sep-99	48.43	48.48	59.02	59.15	46	57	LHP	64.1	54	3	5.6
1999039	4RD	2-Jun-99	2-Jun-99	47.66	47.66	59.35	59.35	70	70	LLS	55.6	35	4	11.4
1999040	4RD	22-Oct-99	22-Oct-99	47.76	47.86	59.41	59.48	79	99	OTB	49.1	46	3	6.5
1999045	4SW	5-Oct-99	5-Oct-99	51.43	51.43	57.63	57.63	15	50	FPN	48.3	78	0	0.0
1999046	4SW	1-Sep-99	1-Sep-99	51.34	51.34	57.31	57.31	40	40	GNS	47.5	34	2	5.9
1999047	4SW	9-Jul-99	28-Jul-99	51.36	51.40	57.45	57.63	54	68	LHP	48.1	32	1	3.1
1999049	4SW	2-Aug-99	30-Aug-99	51.31	51.40	57.22	57.59	35	100	LHP	48.8	663	12	1.8
1999050	4SW	1-Sep-99	29-Sep-99	51.31	51.39	57.25	57.64	40	83	LHP	46.9	169	0	0.0
1999052	4SW	12-Aug-99	13-Aug-99	51.37	51.38	57.16	57.31	24	48	LLS	44.7	30	0	0.0
1999053	4SY	5-Jul-99	13-Jul-99	49.11	49.85	63.00	63.30	154	196	OTB	45.0	55	0	0.0
1999054	4SY	12-Jul-99	14-Jul-99	49.85	50.07	64.50	64.76	154	198	OTB	49.1	123	0	0.0

cont'd.-

Table 9. Details of northern Gulf cod tagging experiments (cont'd).

Expt. number	Release area	Date of release		Position of release				Depth of capture		Gear type	Mean length (cm)	Number tagged	Number recap-tured	Percent recap-tured
		min	max	Latitude (dec.) min	Latitude (dec.) max	Longitude (dec.) min	Longitude (dec.) max	min	max					
2000001	3PN	26-Apr-00	29-Apr-00	47.53	47.57	58.87	58.98	108	132	LLS	56.5	1034	128	12.4
2000002	3PN	3-May-00	23-May-00	47.52	47.61	58.39	58.94	110	132	LLS	54.9	1181	100	8.5
2000003	3PN	20-Nov-00	29-Nov-00	47.52	47.54	59.11	59.14	64	110	LLS	52.0	178	12	6.7
2000004	3PN	2-Dec-00	20-Dec-00	47.55	47.57	58.83	58.95	108	135	LLS	49.5	505	17	3.4
2000005	4RA	20-Jun-00	21-Jun-00	51.42	51.46	56.88	56.89	46	51	LHP	53.9	29	2	6.9
2000006	4RA	27-Jul-00	27-Jul-00	50.71	50.71	57.41	57.41	46	46	LHP	45.1	47	5	10.6
2000007	4RA	11-Jul-00	26-Jul-00	51.39	51.68	56.42	56.88	25	110	LHP	50.3	1100	43	3.9
2000008	4RA	2-Aug-00	30-Aug-00	50.73	51.42	56.65	57.39	46	82	LHP	50.6	168	10	6.0
2000011	4RA	19-Oct-00	19-Oct-00	51.07	51.07	57.11	57.11	73	73	LLS	51.7	37	1	2.7
2000012	4RA	5-Jul-00	5-Jul-00	50.74	50.78	57.68	57.99	72	75	OTB	46.9	37	0	0.0
2000015	4RB	27-Jun-00	27-Jun-00	49.42	49.42	58.24	58.24	39	39	LHP	53.1	34	3	8.8
2000016	4RB	18-Jun-00	18-Jun-00	50.25	50.25	57.60	57.60	37	37	LHP	58.8	27	5	18.5
2000017	4RB	20-Jul-00	25-Jul-00	49.69	49.69	58.17	58.17	64	64	LHP	49.2	63	2	3.2
2000018	4RB	17-Jul-00	25-Jul-00	50.24	50.31	57.56	57.57	33	42	LHP	56.6	151	6	4.0
2000019	4RB	1-Aug-00	21-Aug-00	50.08	50.32	57.56	57.76	37	37	LHP	48.0	92	4	4.3
2000021	4RB	17-Oct-00	17-Oct-00	49.42	49.42	58.24	58.24	39	39	LHP	55.4	124	8	6.5
2000022	4RB	1-Oct-00	19-Oct-00	50.24	50.26	57.60	57.61	20	48	LHP	51.7	46	2	4.3
2000027	4RB	17-Oct-00	18-Oct-00	50.36	50.62	57.52	58.42	86	174	OTB	53.9	112	1	0.9
2000028	4RC	21-Jun-00	23-Jun-00	48.63	48.66	59.10	59.10	51	51	LHP	56.4	181	10	5.5
2000029	4RC	26-Jul-00	26-Jul-00	49.11	49.11	58.43	58.43	26	46	LHP	46.7	91	5	5.5
2000030	4RC	15-Sep-00	27-Sep-00	49.11	49.11	58.43	58.43	33	33	LHP	48.0	89	6	6.7
2000031	4RC	21-Jul-00	27-Jul-00	48.63	48.66	59.10	59.10	55	55	LLS	55.2	179	15	8.4
2000032	4RC	7-Jul-00	7-Jul-00	48.85	48.85	59.20	59.20	70	73	OTB	53.9	61	5	8.2
2000034	4RD	17-Jul-00	27-Jul-00	48.46	48.46	58.69	58.71	18	22	LHP	56.5	292	42	14.4
2000037	4RD	5-Nov-00	6-Nov-00	47.81	47.94	59.40	59.44	35	92	LHP	50.8	85	7	8.2
2000038	4RD	5-Nov-00	5-Nov-00	47.80	47.94	59.40	59.44	92	92	LLS	53.4	127	6	4.7
2000039	4RD	18-Oct-00	18-Oct-00	48.38	48.48	59.15	59.30	60	87	OTB	53.9	71	3	4.2
2000041	4SW	24-Jul-00	24-Jul-00	51.37	51.37	57.17	57.17	10	10	LHP	46.9	84	2	2.4
2000043	4SW	7-Aug-00	30-Aug-00	51.27	51.48	57.25	57.82	5	109	LHP	43.4	422	2	0.5
2000044	4SW	3-Sep-00	7-Sep-00	51.33	51.36	57.31	57.65	15	95	LHP	45.8	122	1	0.8
2000045	4SW	23-Aug-00	30-Aug-00	51.33	51.39	57.26	57.33	48	70	LLS	42.7	106	0	0.0
2000046	4SW	4-Sep-00	7-Sep-00	51.36	51.40	57.32	57.34	52	54	LLS	43.2	33	0	0.0
2001001	3PN	1-May-01	4-May-01	47.56	47.56	58.85	58.95	119	128	LLS	55.3	741	106	14.3
2001002	3PN	4-Oct-01	11-Oct-01	47.57	47.57	58.71	59.12	27	139	LLS	52.3	589	78	13.2
2001003	3PN	12-Nov-01	30-Nov-01	47.55	47.60	58.27	58.93	113	146	LLS	53.4	1046	51	4.9
2001004	3PN	3-Dec-01	10-Dec-01	47.55	47.57	58.81	58.95	119	146	LLS	50.3	613	27	4.4
2001005	3PN	2-Oct-01	2-Oct-01	47.52	47.53	59.01	59.02	123	133	OTB	58.7	40	7	17.5
2001006	4RA	24-Jul-01	24-Jul-01	51.50	51.50	56.82	56.82	28	28	FPN	46.1	289	7	2.4
2001007	4RA	19-Jul-01	24-Jul-01	51.10	51.46	56.86	57.07	49	52	LHP	47.5	585	14	2.4
2001008	4RA	19-Jul-01	19-Jul-01	51.58	51.58	55.75	55.75	20	20	LHP	49.0	68	1	1.5
2001009	4RA	20-Jul-01	28-Jul-01	51.66	51.69	56.44	56.57	24	60	LHP	45.7	51	1	2.0
2001010	4RA	13-Aug-01	21-Aug-01	51.35	51.44	56.57	56.83	67	78	LHP	53.3	292	13	4.5
2001011	4RA	13-Sep-01	28-Sep-01	51.12	51.75	56.32	57.09	32	106	LHP	45.4	397	2	0.5
2001012	4RA	4-Oct-01	11-Oct-01	51.34	51.49	56.76	56.79	64	92	LHP	45.8	171	0	0.0
2001013	4RA	4-Oct-01	21-Oct-01	50.75	51.08	57.05	57.42	47	165	LLS	51.3	357	3	0.8
2001015	4RA	9-Jul-01	9-Jul-01	51.64	51.68	55.86	55.94	35	55	OTB	54.1	103	10	9.7
2001016	4RB	13-Aug-01	22-Aug-01	49.41	50.30	57.56	58.23	31	36	LHP	53.6	502	25	5.0
2001017	4RC	19-Jul-01	19-Jul-01	48.69	48.69	59.09	59.09	55	55	LHP	55.3	27	6	22.2
2001019	4RC	14-Sep-01	20-Sep-01	48.69	48.69	59.09	59.09	55	55	LHP	54.4	145	6	4.1
2001020	4RC	6-Oct-01	6-Oct-01	49.10	49.10	58.43	58.43	25	25	LHP	52.0	159	7	4.4
2001024	4RD	8-Oct-01	11-Oct-01	48.38	48.48	58.68	58.72	18	21	LHP	55.6	195	10	5.1
2001025	4RD	14-Nov-01	14-Nov-01	48.48	48.48	58.68	58.68	24	24	LHP	47.7	38	0	0.0
2001026	4RD	26-Nov-01	26-Nov-01	47.83	47.83	59.44	59.44	87	87	LLS	53.5	178	7	3.9
2001027	4RD	2-Oct-01	2-Oct-01	47.74	47.88	59.39	59.48	59	110	OTB	54.3	31	1	3.2
2001028	4SW	18-Jul-01	22-Jul-01	51.36	51.36	57.58	57.58	80	80	LHP	53.4	63	1	1.6
2001029	4SW	1-Aug-01	30-Aug-01	51.36	51.37	57.27	57.58	48	90	LHP	45.8	127	0	0.0
2001031	4SW	4-Aug-01	17-Aug-01	51.29	51.40	57.28	57.80	30	49	LLS	43.7	26	0	0.0

cont'd.-

Table 9. Details of northern Gulf cod tagging experiments (cont'd).

Expt. number	Release area	Date of release		Position of release				Depth of capture		Gear type	Mean length (cm)	Number tagged	Number recap-tured	Percent recap-tured
		min	max	Latitude (dec.) min	Latitude (dec.) max	Longitude (dec.) min	Longitude (dec.) max	min	max					
2002001	3PN	29-Apr-02	29-Apr-02	47.57	47.57	58.87	58.87	135	135	LLS	54.3	374	16	4.3
2002002	3PN	1-May-02	28-May-02	47.56	47.59	58.54	58.88	120	152	LLS	54.7	1670	118	7.1
2002004	3PN	9-Oct-02	14-Oct-02	47.55	47.57	58.69	59.10	90	156	LLS	53.5	1183	72	6.1
2002005	3PN	11-Nov-02	12-Nov-02	47.56	47.56	58.93	58.93	110	110	LLS	52.4	99	1	1.0
2002006	3PN	20-Dec-02	20-Dec-02	47.56	47.57	58.89	58.95	100	100	LLS	50.9	72	0	0.0
2002007	4RA	28-Jun-02	28-Jun-02	50.79	50.79	57.25	57.25	62	62	LHP	51.8	31	0	0.0
2002008	4RA	25-Jul-02	25-Jul-02	51.41	51.41	56.93	56.93	57	57	LHP	52.0	45	2	4.4
2002009	4RA	14-Aug-02	28-Aug-02	51.45	51.51	56.76	56.87	59	106	LHP	48.7	581	1	0.2
2002011	4RB	26-Jul-02	26-Jul-02	50.32	50.32	57.58	57.58	55	55	LHP	61.6	95	16	16.8
2002012	4RB	9-Sep-02	9-Sep-02	49.41	49.41	58.23	58.23	33	33	LHP	54.4	79	0	0.0
2002015	4RC	8-Jun-02	8-Jun-02	48.65	48.65	59.11	59.11	55	55	LHP	54.0	180	13	7.2
2002016	4RC	19-Jun-02	29-Jun-02	48.65	48.67	59.09	59.11	55	55	LLS	55.9	255	17	6.7
2002017	4RD	11-Oct-02	11-Oct-02	47.87	47.87	59.47	59.47	110	110	LLS	54.0	173	3	1.7
2002018	4SW	12-Jul-02	24-Jul-02	51.37	51.40	57.40	57.58	51	75	LHP	52.9	97	1	1.0
2002019	4SW	14-Aug-02	28-Aug-02	51.35	51.40	57.26	57.47	46	100	LHP	43.9	286	0	0.0
2002020	4SW	4-Sep-02	19-Sep-02	51.34	51.41	57.25	57.58	47	90	LHP	43.8	211	0	0.0
2003001	3PN	21-May-03	27-May-03	47.56	47.57	58.73	58.93	105	119	LLS	54.9	205	4	2.0
2003003	3PN	13-Oct-03	13-Oct-03	47.57	47.57	58.87	58.87	119	119	LLS	51.5	286	2	0.7
2003004	3PN	1-Nov-03	11-Nov-03	47.55	47.57	58.87	58.99	119	119	LLS	51.7	609	0	0.0
2003005	4RD	7-Nov-03	7-Nov-03	47.84	47.84	59.45	59.45	108	108	LLS	55.3	189	0	0.0

Table 10. Annual summary of reported recaptures by experiment (all tag types combined) for cod tagged and released in 3Pn4RS during 1995-2003. Only experiments where >25 cod were tagged are shown.

		Release date		Mean length	Number	Recapture year									
Expt	Area	min	max	(cm)	tagged	1995	1996	1997	1998	1999	2000	2001	2002	2003	unk
1995001	3PN	11-Nov-95	30-Nov-95	54.3	109	0	1	1	1	2	1	0	0	0	0
1995002	3PN	13-Nov-95	30-Nov-95	55.0	110	0	1	3	0	1	0	0	0	0	3
1995003	3PN	4-Dec-95	6-Dec-95	53.5	93	0	0	1	0	0	0	0	0	0	1
1995004	4RA	17-Jul-95	21-Jul-95	44.8	144	0	0	2	1	0	1	1	0	0	0
1995006	4RB	15-Sep-95	25-Sep-95	44.3	45	0	0	1	1	0	1	0	0	0	0
1995007	4RB	2-Oct-95	2-Oct-95	47.3	39	0	0	0	1	0	0	0	0	0	0
1995008	4RB	22-Sep-95	22-Sep-95	53.1	46	0	0	0	0	0	0	0	0	0	1
1995010	4RC	26-Sep-95	28-Sep-95	65.5	177	0	3	2	2	1	0	0	0	0	0
1995011	4RC	2-Oct-95	21-Oct-95	59.3	368	0	11	7	1	1	0	0	0	0	0
1996001	3KA	30-Jul-96	31-Jul-96	48.8	32	.	0	0	0	0	0	0	0	0	0
1996002	3KA	1-Aug-96	23-Aug-96	46.0	33	.	0	0	0	0	0	0	0	0	0
1996004	3PN	5-Aug-96	25-Aug-96	56.9	167	.	1	9	3	2	0	1	0	0	5
1996005	3PN	12-Aug-96	22-Aug-96	57.3	302	.	0	5	18	10	3	1	1	0	5
1996006	3PN	1-Sep-96	18-Sep-96	51.9	237	.	7	8	4	0	1	0	1	0	1
1996007	3PN	17-Sep-96	17-Sep-96	63.5	35	.	0	0	0	0	0	0	0	0	0
1996008	3PN	20-Sep-96	22-Sep-96	46.0	64	.	1	1	0	1	0	0	1	0	0
1996009	3PN	18-Sep-96	18-Sep-96	54.7	57	.	1	1	0	1	0	0	0	0	0
1996010	3PN	30-Sep-96	30-Sep-96	49.2	77	.	0	1	0	0	0	0	0	0	0
1996011	3PN	2-Sep-96	8-Sep-96	56.0	254	.	0	6	13	4	3	0	1	0	13
1996012	3PN	18-Oct-96	31-Oct-96	55.1	184	.	0	7	2	2	3	0	1	0	1
1996014	3PN	9-Oct-96	28-Oct-96	52.9	185	.	0	1	0	1	2	0	0	0	0
1996016	3PN	8-Oct-96	30-Oct-96	57.0	475	.	1	17	13	5	2	2	4	0	5
1996017	3PN	5-Nov-96	20-Nov-96	54.0	832	.	1	13	10	6	5	0	2	0	0
1996018	3PN	14-Nov-96	14-Nov-96	54.8	40	.	0	2	0	0	0	0	0	0	0
1996019	3PN	5-Nov-96	25-Nov-96	52.0	565	.	0	22	13	11	4	0	4	0	0
1996020	3PN	3-Dec-96	14-Dec-96	46.8	251	.	0	1	2	5	1	0	0	0	0
1996021	3PN	9-Oct-96	14-Oct-96	53.0	48	.	0	0	1	0	1	0	0	0	0
1996025	3PSA	6-Nov-96	23-Nov-96	52.3	108	.	1	2	0	1	1	0	1	0	0
1996026	3PSA	4-Dec-96	18-Dec-96	50.1	67	.	0	0	0	0	0	2	0	0	0
1996031	4RA	10-Sep-96	26-Sep-96	59.4	62	.	0	1	1	0	1	1	0	0	1
1996032	4RA	12-Aug-96	23-Aug-96	49.3	65	.	0	0	2	0	0	0	0	0	0
1996033	4RA	3-Sep-96	27-Sep-96	46.8	293	.	1	1	2	1	0	0	1	0	0
1996035	4RA	3-Aug-96	30-Aug-96	49.7	988	.	1	10	6	6	2	0	0	0	0
1996036	4RA	2-Sep-96	30-Sep-96	48.6	639	.	0	0	1	0	2	0	3	0	2
1996038	4RA	4-Sep-96	30-Sep-96	43.6	71	.	0	0	0	0	0	0	0	0	0
1996039	4RA	2-Oct-96	22-Oct-96	47.5	110	.	0	0	0	0	1	1	0	0	0
1996040	4RA	2-Oct-96	17-Oct-96	47.3	264	.	0	0	0	0	0	1	2	0	0
1996043	4RB	7-Oct-96	10-Oct-96	48.2	159	.	0	3	5	4	1	0	0	0	0
1996044	4RB	25-Aug-96	28-Aug-96	49.7	139	.	0	0	2	3	0	1	0	0	0
1996045	4RB	4-Sep-96	27-Sep-96	48.4	121	.	0	2	0	2	0	1	1	0	0
1996047	4RB	1-Aug-96	20-Aug-96	53.8	40	.	0	0	0	1	1	0	0	0	0
1996048	4RB	12-Sep-96	27-Sep-96	47.7	438	.	2	5	3	8	1	1	1	0	0
1996049	4RB	1-Oct-96	3-Oct-96	44.7	209	.	3	0	3	2	1	0	0	0	2
1996059	4RC	5-Aug-96	29-Aug-96	50.6	251	.	0	3	5	2	2	1	2	0	0
1996060	4RC	6-Aug-96	28-Aug-96	62.4	482	.	8	11	10	1	2	1	1	0	2
1996061	4RC	10-Sep-96	25-Sep-96	59.2	62	.	0	1	0	0	0	0	0	0	0
1996063	4RC	27-Nov-96	29-Nov-96	57.8	37	.	0	0	0	1	0	0	0	0	0
1996066	4RD	9-Sep-96	9-Sep-96	54.9	30	.	0	1	0	0	1	0	0	0	0
1996068	4RD	17-Sep-96	25-Sep-96	55.3	52	.	0	3	2	1	0	0	0	0	0
1996069	4RD	8-Oct-96	30-Oct-96	53.5	315	.	3	2	8	5	1	1	3	0	2
1996071	4RD	12-Nov-96	30-Nov-96	54.9	121	.	0	3	2	2	0	0	0	0	0
1996073	4RD	13-Oct-96	13-Oct-96	49.6	50	.	1	1	0	0	0	2	0	0	0
1996075	4RD	13-Oct-96	13-Oct-96	51.6	58	.	0	0	1	0	0	1	0	0	0
1996077	4SW	25-Aug-96	28-Aug-96	51.2	113	.	0	1	0	0	0	1	0	0	0
1996078	4SW	27-Aug-96	31-Aug-96	48.9	358	.	0	0	1	3	0	2	0	0	0
1996079	4SW	2-Sep-96	23-Sep-96	49.7	118	.	0	5	1	0	0	0	1	0	0
1996080	4SW	1-Sep-96	18-Sep-96	47.1	520	.	0	3	3	2	0	3	0	0	3

cont'd.

Table 10. Annual summary of recaptures (cont.'d).

Expt	Area	Release date min	Release date max	Mean length (cm)	Number tagged	Recapture year 1995	1996	1997	1998	1999	2000	2001	2002	2003	unk
1997002	3PN	11-Jun-97	24-Jun-97	52.1	194	.	.	6	5	2	0	1	0	0	3
1997003	3PN	4-Nov-97	12-Nov-97	55.0	183	.	.	1	4	1	1	2	1	0	1
1997005	4RA	26-Aug-97	28-Aug-97	43.6	129	.	.	0	0	3	1	0	0	0	0
1997006	4RA	1-Sep-97	26-Sep-97	46.6	452	.	.	0	3	1	0	0	1	1	0
1997007	4RA	1-Oct-97	16-Oct-97	43.1	279	.	.	1	2	1	1	0	0	0	0
1997008	4RB	3-Sep-97	17-Sep-97	45.5	130	.	.	0	0	4	1	1	1	0	0
1997009	4RB	7-Oct-97	7-Oct-97	44.1	147	.	.	0	0	0	0	1	0	0	0
1997011	4RC	25-Jun-97	30-Jun-97	55.8	170	.	.	8	3	3	2	0	1	0	1
1997012	4RC	1-Jul-97	1-Jul-97	58.3	98	.	.	5	1	0	0	0	0	0	0
1997013	4RC	21-Aug-97	23-Aug-97	48.8	198	.	.	2	3	8	3	5	0	0	0
1997021	4SW	21-Jul-97	30-Jul-97	53.5	39	.	.	0	0	0	0	0	0	0	0
1997022	4SW	1-Aug-97	28-Aug-97	48.8	534	.	.	3	3	9	5	1	0	0	0
1997024	4SW	1-Sep-97	16-Sep-97	49.2	56	.	.	0	0	1	1	0	0	0	0
1997025	4SW	1-Sep-97	23-Sep-97	48.3	183	.	.	0	0	1	0	0	0	0	0
1998001	3PN	15-Dec-98	15-Dec-98	52.6	45	.	.	.	0	0	0	0	0	0	0
1998004	3PN	20-Nov-98	20-Nov-98	50.3	113	.	.	.	0	9	5	1	0	0	0
1998005	4RA	27-Aug-98	31-Aug-98	45.8	289	.	.	.	1	2	3	2	3	0	0
1998010	4SW	25-Jul-98	25-Jul-98	49.1	57	.	.	.	0	3	1	3	0	0	0
1998012	4SW	23-Jul-98	24-Jul-98	43.3	60	.	.	.	0	1	0	0	0	0	0
1998013	4SW	3-Jul-98	28-Jul-98	48.9	175	.	.	.	0	3	0	0	1	0	0
1998015	4SW	5-Aug-98	31-Aug-98	45.2	1137	.	.	.	1	3	7	8	3	0	0
1998016	4SW	7-Sep-98	10-Sep-98	44.3	52	.	.	.	0	0	0	0	0	0	0
1998018	4SW	1-Sep-98	11-Sep-98	45.9	464	.	.	.	0	2	6	2	0	0	0
1998024	4SY	6-Jul-98	15-Jul-98	48.0	181	.	.	.	0	0	0	0	0	0	0
1998028	4SY	7-Jul-98	7-Jul-98	51.8	51	.	.	.	0	0	0	0	0	0	0
1998030	4SY	7-Oct-98	7-Oct-98	46.9	40	.	.	.	0	0	0	0	0	0	0
1999001	3PN	5-May-99	30-May-99	53.8	313	.	.	.	.	17	8	7	3	0	1
1999002	3PN	1-Jun-99	14-Jun-99	50.9	185	.	.	.	.	10	0	2	0	0	0
1999003	3PN	4-Jul-99	21-Jul-99	52.4	145	.	.	.	.	15	2	2	0	0	0
1999004	3PN	21-Oct-99	22-Oct-99	54.1	467	.	.	.	.	6	18	21	5	0	0
1999005	3PN	28-Oct-99	28-Oct-99	53.9	66	.	.	.	.	2	2	3	2	0	0
1999006	3PN	6-Nov-99	24-Nov-99	54.7	745	.	.	.	.	1	22	15	9	0	0
1999007	3PN	10-Dec-99	10-Dec-99	49.7	34	.	.	.	.	0	1	0	0	0	0
1999011	4RA	23-Jun-99	29-Jun-99	53.1	391	.	.	.	.	13	9	7	2	0	0
1999012	4RA	10-Jul-99	28-Jul-99	49.7	134	.	.	.	.	0	4	0	1	0	0
1999014	4RA	1-Sep-99	30-Sep-99	47.9	321	.	.	.	.	2	2	1	0	0	1
1999015	4RA	1-Oct-99	1-Oct-99	48.4	45	.	.	.	.	0	0	0	0	0	0
1999016	4RA	27-Jun-99	30-Jun-99	54.8	260	.	.	.	.	15	5	5	2	0	0
1999017	4RA	9-Jul-99	9-Jul-99	52.5	91	.	.	.	.	1	1	2	1	0	0
1999019	4RB	25-Jun-99	28-Jun-99	53.9	164	.	.	.	.	3	6	0	1	0	0
1999020	4RB	23-Sep-99	27-Sep-99	55.5	149	.	.	.	.	1	8	2	1	0	0
1999021	4RB	22-Oct-99	23-Oct-99	54.2	86	.	.	.	.	0	2	2	0	0	0
1999022	4RB	10-Jun-99	26-Jun-99	55.0	222	.	.	.	.	3	4	1	5	1	0
1999024	4RB	8-Jul-99	8-Jul-99	51.7	170	.	.	.	.	5	5	1	0	0	0
1999026	4RB	18-Oct-99	18-Oct-99	52.0	64	.	.	.	.	0	3	0	0	0	0
1999027	4RC	24-Jun-99	27-Jun-99	54.0	162	.	.	.	.	3	5	5	4	0	0
1999028	4RC	29-Jun-99	29-Jun-99	54.9	74	.	.	.	.	7	5	3	1	0	0
1999029	4RC	14-Jul-99	14-Jul-99	48.2	58	.	.	.	.	2	3	1	0	0	0
1999030	4RC	28-Jul-99	28-Jul-99	56.5	119	.	.	.	.	14	5	4	1	0	0
1999032	4RC	28-Sep-99	30-Sep-99	55.2	101	.	.	.	.	0	6	3	0	1	0
1999033	4RC	2-Oct-99	2-Oct-99	57.9	120	.	.	.	.	1	6	3	2	0	0
1999034	4RC	7-Jul-99	7-Jul-99	49.9	102	.	.	.	.	1	0	1	0	0	0
1999035	4RC	8-Jul-99	8-Jul-99	50.5	80	.	.	.	.	1	0	0	0	0	1
1999036	4RD	28-Jun-99	28-Jun-99	52.2	31	.	.	.	.	0	0	0	0	0	0
1999038	4RD	16-Sep-99	29-Sep-99	64.1	54	.	.	.	.	1	2	0	0	0	0
1999039	4RD	2-Jun-99	2-Jun-99	55.6	35	.	.	.	.	3	0	1	0	0	0
1999040	4RD	22-Oct-99	22-Oct-99	49.1	46	.	.	.	.	0	1	2	0	0	0
1999045	4SW	5-Oct-99	5-Oct-99	48.3	78	.	.	.	.	0	0	0	0	0	0
1999046	4SW	1-Sep-99	1-Sep-99	47.5	34	.	.	.	.	0	0	0	2	0	0
1999047	4SW	9-Jul-99	28-Jul-99	48.1	32	.	.	.	.	1	0	0	0	0	0
1999049	4SW	2-Aug-99	30-Aug-99	48.8	663	.	.	.	.	2	3	4	3	0	0
1999050	4SW	1-Sep-99	29-Sep-99	46.9	169	.	.	.	.	0	0	0	0	0	0
1999052	4SW	12-Aug-99	13-Aug-99	44.7	30	.	.	.	.	0	0	0	0	0	0
1999053	4SY	5-Jul-99	13-Jul-99	45.0	55	.	.	.	.	0	0	0	0	0	0
1999054	4SY	12-Jul-99	14-Jul-99	49.1	123	.	.	.	.	0	0	0	0	0	0

cont'd.

Table 10. Annual summary of recaptures (cont.'d).

Expt	Area	Release date min	Release date max	Mean length (cm)	Number tagged	Recapture year 1995	1996	1997	1998	1999	2000	2001	2002	2003	unk
2002001	3PN	29-Apr-02	29-Apr-02	54.3	374	.	.	.	.	.	.	.	15	1	0
2002002	3PN	1-May-02	28-May-02	54.7	1670	.	.	.	.	.	.	.	106	12	0
2002004	3PN	9-Oct-02	14-Oct-02	53.5	1183	.	.	.	.	.	.	.	55	17	0
2002005	3PN	11-Nov-02	12-Nov-02	52.4	99	.	.	.	.	.	.	.	0	1	0
2002006	3PN	20-Dec-02	20-Dec-02	50.9	72	.	.	.	.	.	.	.	0	0	0
2002007	4RA	28-Jun-02	28-Jun-02	51.8	31	.	.	.	.	.	.	.	0	0	0
2002008	4RA	25-Jul-02	25-Jul-02	52.0	45	.	.	.	.	.	.	.	2	0	0
2002009	4RA	14-Aug-02	28-Aug-02	48.7	581	.	.	.	.	.	.	.	1	0	0
2002011	4RB	26-Jul-02	26-Jul-02	61.6	95	.	.	.	.	.	.	.	15	1	0
2002012	4RB	9-Sep-02	9-Sep-02	54.4	79	.	.	.	.	.	.	.	0	0	0
2002015	4RC	8-Jun-02	8-Jun-02	54.0	180	.	.	.	.	.	.	.	10	3	0
2002016	4RC	19-Jun-02	29-Jun-02	55.9	255	.	.	.	.	.	.	.	16	1	0
2002017	4RD	11-Oct-02	11-Oct-02	54.0	173	.	.	.	.	.	.	.	3	0	0
2002018	4SW	12-Jul-02	24-Jul-02	52.9	97	.	.	.	.	.	.	.	0	1	0
2002019	4SW	14-Aug-02	28-Aug-02	43.9	286	.	.	.	.	.	.	.	0	0	0
2002020	4SW	4-Sep-02	19-Sep-02	43.8	211	.	.	.	.	.	.	.	0	0	0
2003001	3PN	21-May-03	27-May-03	54.9	205	.	.	.	.	.	.	.	.	4	0
2003003	3PN	13-Oct-03	13-Oct-03	51.5	286	.	.	.	.	.	.	.	.	2	0
2003004	3PN	1-Nov-03	11-Nov-03	51.7	609	.	.	.	.	.	.	.	.	0	0
2003005	4RD	7-Nov-03	7-Nov-03	55.3	189	.	.	.	.	.	.	.	.	0	0

Table 11. Estimates of annual exploitation (harvest rate) by experiment (where n>50) for cod tagged in 3Pn4RS during 2000-2003. Recaptures were adjusted using estimated reporting rates (0.38) and releases were adjusted using estimates of initial tagging mortality (3% for release months December-June and 25% for July-November), and tag loss (Kirkwood model loss rates estimated from 3Ps cod tagging study). The rate of natural mortality (m) was assumed to be either 0.2 or 0.4 per year.

					m=0.2				m=0.4			
		Release date		Number	Exploitation estimate (%)				Exploitation estimate (%)			
Expt	Area	min	max	tagged	2000	2001	2002	2003	2000	2001	2002	2003
2000001	3PN	26-Apr-00	29-Apr-00	1034	16.9	23.1	21.2	0.0	18.0	29.6	37.5	0.0
2000002	3PN	3-May-00	23-May-00	1181	10.0	12.6	13.1	1.7	10.6	16.3	21.6	3.9
2000003	3PN	20-Nov-00	29-Nov-00	178	0.0	23.0	12.9	0.0	0.0	27.0	18.7	0.0
2000004	3PN	2-Dec-00	20-Dec-00	505	0.7	9.9	7.2	1.8	0.7	11.6	10.7	3.2
2001001	3PN	1-May-01	4-May-01	741	.	22.3	12.1	1.1	.	23.4	16.1	1.8
2001002	3PN	4-Oct-01	11-Oct-01	589	.	22.1	40.6	9.6	.	22.3	48.7	16.7
2001003	3PN	12-Nov-01	30-Nov-01	1046	.	0.0	21.1	3.0	.	0.0	24.1	4.5
2001004	3PN	3-Dec-01	10-Dec-01	613	.	0.0	18.6	3.3	.	0.0	21.3	4.9
2002001	3PN	29-Apr-02	29-Apr-02	374	.	.	13.8	1.3	.	.	14.8	1.7
2002002	3PN	1-May-02	28-May-02	1670	.	.	20.4	3.0	.	.	21.6	4.0
2002004	3PN	9-Oct-02	14-Oct-02	1183	.	.	16.8	8.4	.	.	17.0	10.4
2002005	3PN	11-Nov-02	12-Nov-02	99	.	.	0.0	2.9	.	.	0.0	3.5
2002006	3PN	20-Dec-02	20-Dec-02	72	.	.	0.0	0.0	.	.	0.0	0.0
2003001	3PN	21-May-03	27-May-03	205	.	.	.	5.6	.	.	.	5.8
2003003	3PN	13-Oct-03	13-Oct-03	286	.	.	.	2.6	.	.	.	2.7
2003004	3PN	1-Nov-03	11-Nov-03	609	.	.	.	0.0	.	.	.	0.0

					m=0.2				m=0.4			
		Release date		Number	Exploitation estimate (%)				Exploitation estimate (%)			
Expt	Area	min	max	tagged	2000	2001	2002	2003	2000	2001	2002	2003
2000007	4RA	11-Jul-00	26-Jul-00	1100	3.9	7.4	9.3	1.5	4.0	9.1	14.1	2.9
2000008	4RA	2-Aug-00	30-Aug-00	168	2.3	18.7	9.5	3.8	2.4	22.9	14.8	8.1
2001006	4RA	24-Jul-01	24-Jul-01	289		3.8	7.3	0.0		3.8	8.8	0.0
2001007	4RA	19-Jul-01	24-Jul-01	585		2.5	7.3	1.4		2.5	9.1	2.1
2001008	4RA	19-Jul-01	19-Jul-01	68		0.0	8.2	0.0		0.0	10.6	0.0
2001009	4RA	20-Jul-01	28-Jul-01	51		0.0	10.5	0.0		0.0	13.4	0.0
2001010	4RA	13-Aug-01	21-Aug-01	292		5.8	11.2	1.5		5.9	13.6	2.2
2001011	4RA	13-Sep-01	28-Sep-01	397		0.0	1.8	0.0		0.0	2.2	0.0
2001012	4RA	4-Oct-01	11-Oct-01	171		0.0	0.0	0.0		0.0	0.0	0.0
2001013	4RA	4-Oct-01	21-Oct-01	357		0.0	2.8	1.8		0.0	3.3	2.6
2001015	4RA	9-Jul-01	9-Jul-01	103		11.5	37.5	0.0		11.8	47.5	0.0
2002009	4RA	14-Aug-02	28-Aug-02	581			0.7	0.0			0.7	0.0
2000017	4RB	20-Jul-00	25-Jul-00	63	0.0	0.0	20.7	0.0	0.0	0.0	30.9	0.0
2000018	4RB	17-Jul-00	25-Jul-00	151	2.3	10.4	8.9	0.0	2.3	12.6	12.7	0.0
2000019	4RB	1-Aug-00	21-Aug-00	92	0.0	11.3	16.1	0.0	0.0	13.9	24.8	0.0
2000021	4RB	17-Oct-00	17-Oct-00	124	2.8	8.4	27.8	0.0	2.9	10.1	40.3	0.0
2000027	4RB	17-Oct-00	18-Oct-00	112	0.0	0.0	5.4	0.0	0.0	0.0	7.4	0.0
2001016	4RB	13-Aug-01	22-Aug-01	502		3.7	18.7	3.3		3.8	22.6	5.1
2002011	4RB	26-Jul-02	26-Jul-02	95			61.5	15.3			63.0	20.4
2002012	4RB	9-Sep-02	9-Sep-02	79			0.0	0.0			0.0	0.0

cont'd.-

Table 11. Estimates of annual exploitation (harvest) rate (cont.'d.)

		Release date		Number	m=0.2 Exploitation estimate (%)				m=0.4 Exploitation estimate (%)			
Expt	Area	min	max	tagged	2000	2001	2002	2003	2000	2001	2002	2003
2000028	4RC	21-Jun-00	23-Jun-00	181	3.5	14.4	7.4	0.0	3.7	17.9	12.1	0.0
2000029	4RC	26-Jul-00	26-Jul-00	91	4.5	11.8	12.1	0.0	4.8	14.6	18.5	0.0
2000030	4RC	15-Sep-00	27-Sep-00	89	0.0	16.1	16.6	12.2	0.0	18.7	24.8	23.8
2000031	4RC	21-Jul-00	27-Jul-00	179	12.7	13.0	24.6	0.0	12.9	15.8	38.9	0.0
2000032	4RC	7-Jul-00	7-Jul-00	61	14.1	9.8	27.7	0.0	15.3	12.1	43.5	0.0
2001019	4RC	14-Sep-01	20-Sep-01	145		2.7	17.9	0.0		2.7	21.3	0.0
2001020	4RC	6-Oct-01	6-Oct-01	159		4.9	16.2	0.0		5.0	18.9	0.0
2002015	4RC	8-Jun-02	8-Jun-02	180			17.0	8.9			18.3	11.7
2002016	4RC	19-Jun-02	29-Jun-02	255			19.5	1.1			20.3	1.4
2000034	4RD	17-Jul-00	27-Jul-00	292	5.3	41.7	43.5	16.7	5.5	51.6	77.1	64.7
2000037	4RD	5-Nov-00	6-Nov-00	85	0.0	13.0	3.2	0.0	0.0	15.0	4.5	0.0
2000038	4RD	5-Nov-00	5-Nov-00	127	0.0	7.4	2.0	0.0	0.0	8.8	2.9	0.0
2000039	4RD	18-Oct-00	18-Oct-00	71	0.0	14.0	10.7	0.0	0.0	16.6	16.6	0.0
2001024	4RD	8-Oct-01	11-Oct-01	195		0.0	23.6	0.0		0.0	27.9	0.0
2001025	4RD	14-Nov-01	14-Nov-01	38		0.0	0.0	0.0		0.0	0.0	0.0
2001026	4RD	26-Nov-01	26-Nov-01	178		0.0	16.1	3.9		0.0	18.6	5.6
2002017	4RD	11-Oct-02	11-Oct-02	173			6.5	0.0			6.6	0.0
2003005	4RD	7-Nov-03	7-Nov-03	189				0.0				0.0
2000041	4SW	24-Jul-00	24-Jul-00	84	0.0	6.4	8.6	0.0	0.0	8.1	13.3	0.0
2000043	4SW	7-Aug-00	30-Aug-00	422	0.0	0.0	3.1	0.0	0.0	0.0	4.6	0.0
2000044	4SW	3-Sep-00	7-Sep-00	122	0.0	0.0	5.0	0.0	0.0	0.0	7.1	0.0
2000045	4SW	23-Aug-00	30-Aug-00	106	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2001028	4SW	18-Jul-01	22-Jul-01	63		6.0	0.0	0.0		6.1	0.0	0.0
2001029	4SW	1-Aug-01	30-Aug-01	127		0.0	0.0	0.0		0.0	0.0	0.0
2002018	4SW	12-Jul-02	24-Jul-02	97			0.0	5.2			0.0	6.3
2002019	4SW	14-Aug-02	28-Aug-02	286			0.0	0.0			0.0	0.0
2002020	4SW	4-Sep-02	19-Sep-02	211			0.0	0.0			0.0	0.0

Table 12. Annual distribution of recaptures for cod tagged in various regions of 3Pn4RS during 1995-2003. Recaptures were adjusted by annual and region-specific reporting rates estimated from a high-reward tagging study. Shaded cells give the percentage of tags returned from the area of release.

Release area	Release year	Number tagged	Recap. year	Number recaptured	Percent recaptured													
					2J3KL	3Psg/h	3Psd	3Pse/f	3Psc	3Psb	3Psa	3Pn	4Rd	4Rc	4Rb	4Ra	4Svwy	4TVn	Unk
3PN	1995	312	1995	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN			1996	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN			1997	9	0.0	0.0	0.0	0.0	0.0	0.0	33.3	22.2	22.2	22.2	0.0	0.0	0.0	0.0	0.0
3PN			1998	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
3PN			1999	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0	0.0	0.0	0.0	0.0
3PN			2000	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN	1996	3858	1996	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN			1997	174	0.0	0.0	0.0	0.6	3.4	3.4	6.9	64.4	8.6	4.6	3.4	1.1	3.4	0.0	0.0
3PN			1998	143	1.4	0.0	0.0	0.0	4.2	4.2	11.9	67.1	7.0	1.4	1.4	1.4	0.0	0.0	0.0
3PN			1999	79	2.5	1.3	0.0	0.0	22.8	10.1	8.9	34.2	0.0	10.1	10.1	0.0	0.0	0.0	0.0
3PN			2000	39	0.0	0.0	2.6	2.6	2.6	5.1	7.7	53.8	10.3	10.3	0.0	5.1	0.0	0.0	0.0
3PN			2001	7	0.0	0.0	0.0	0.0	0.0	0.0	14.3	85.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN			2002	27	0.0	0.0	0.0	0.0	3.7	3.7	0.0	77.8	7.4	0.0	0.0	0.0	7.4	0.0	0.0
3PN	1997	388	1997	18	0.0	0.0	0.0	0.0	0.0	0.0	5.6	83.3	11.1	0.0	0.0	0.0	0.0	0.0	0.0
3PN			1998	18	0.0	0.0	0.0	0.0	11.1	0.0	33.3	44.4	0.0	0.0	0.0	0.0	11.1	0.0	0.0
3PN			1999	5	0.0	0.0	20.0	0.0	0.0	0.0	0.0	40.0	0.0	0.0	40.0	0.0	0.0	0.0	0.0
3PN			2000	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
3PN			2001	5	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	40.0	0.0	0.0	40.0	0.0	0.0	0.0
3PN			2002	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN	1998	176	1998	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN			1999	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN			2000	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0
3PN			2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN	1999	1955	1999	85	1.2	0.0	0.0	0.0	1.2	0.0	12.9	80.0	2.4	2.4	0.0	0.0	0.0	0.0	0.0
3PN			2000	91	0.0	0.0	0.0	0.0	1.1	0.0	7.7	33.0	17.6	8.8	16.5	7.7	6.6	1.1	0.0
3PN			2001	91	0.0	0.0	0.0	0.0	0.0	0.0	2.2	52.7	13.2	11.0	7.7	8.8	4.4	0.0	0.0
3PN			2002	33	0.0	0.0	0.0	0.0	3.0	0.0	0.0	39.4	18.2	6.1	15.2	6.1	12.1	0.0	0.0
3PN	2000	2898	2000	164	0.0	0.0	0.6	0.0	0.6	0.6	9.1	40.2	14.0	15.9	11.6	6.1	1.2	0.0	0.0
3PN			2001	172	0.0	0.0	0.0	0.0	0.6	0.6	3.5	50.6	14.0	14.0	11.0	5.8	0.0	0.0	0.0
3PN			2002	104	0.0	0.0	0.0	0.0	2.9	0.0	3.8	63.5	4.8	8.7	8.7	7.7	0.0	0.0	0.0
3PN			2003	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	33.3	33.3	0.0	0.0	0.0	0.0
3PN	2001	3029	2001	178	0.0	0.0	0.0	0.0	0.0	0.0	3.4	64.6	3.9	12.4	7.3	5.1	3.4	0.0	0.0
3PN			2002	230	0.0	0.0	0.0	0.0	0.9	0.0	0.4	63.9	8.3	9.1	5.7	9.1	2.6	0.0	0.0
3PN			2003	15	0.0	0.0	0.0	0.0	6.7	0.0	0.0	73.3	0.0	20.0	0.0	0.0	0.0	0.0	0.0
3PN	2002	3404	2002	315	0.0	0.0	1.3	0.0	0.3	0.0	1.6	75.2	3.8	6.0	6.3	4.1	1.3	0.0	0.0
3PN			2003	44	0.0	0.0	2.3	2.3	0.0	2.3	20.5	54.5	4.5	4.5	9.1	0.0	0.0	0.0	0.0
3PN	2003	1124	2003	13	0.0	0.0	0.0	0.0	0.0	7.7	0.0	30.8	0.0	15.4	30.8	15.4	0.0	0.0	0.0

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Table 12. Annual distribution of recaptures for cod tagged in various regions of 3Pn4RS during 1995-2003. Recaptures were adjusted by annual and region-specific reporting rates estimated from a high-reward tagging study. Shaded cells give the percentage of tags returned from the area of release.

Release area	Release year	Number tagged	Recap. year	Number recaptured	Percent recaptured													
					2J3KL	3Psg/h	3Psd	3Pse/f	3Psc	3Psb	3Psa	3Pn	4Rd	4Rc	4Rb	4Ra	4Svwy	4TVn	Unk
3PN	1995	312	1995	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN			1996	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN			1997	9	0.0	0.0	0.0	0.0	0.0	0.0	33.3	22.2	22.2	22.2	0.0	0.0	0.0	0.0	0.0
3PN			1998	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
3PN			1999	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0	0.0	0.0	0.0	0.0
3PN			2000	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN	1996	3858	1996	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN			1997	174	0.0	0.0	0.0	0.6	3.4	3.4	6.9	64.4	8.6	4.6	3.4	1.1	3.4	0.0	0.0
3PN			1998	143	1.4	0.0	0.0	0.0	4.2	4.2	11.9	67.1	7.0	1.4	1.4	1.4	0.0	0.0	0.0
3PN			1999	79	2.5	1.3	0.0	0.0	22.8	10.1	8.9	34.2	0.0	10.1	10.1	0.0	0.0	0.0	0.0
3PN			2000	39	0.0	0.0	2.6	2.6	2.6	5.1	7.7	53.8	10.3	10.3	0.0	5.1	0.0	0.0	0.0
3PN			2001	7	0.0	0.0	0.0	0.0	0.0	0.0	14.3	85.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN			2002	27	0.0	0.0	0.0	0.0	3.7	3.7	0.0	77.8	7.4	0.0	0.0	0.0	7.4	0.0	0.0
3PN	1997	388	1997	18	0.0	0.0	0.0	0.0	0.0	0.0	5.6	83.3	11.1	0.0	0.0	0.0	0.0	0.0	0.0
3PN			1998	18	0.0	0.0	0.0	0.0	11.1	0.0	33.3	44.4	0.0	0.0	0.0	0.0	11.1	0.0	0.0
3PN			1999	5	0.0	0.0	20.0	0.0	0.0	0.0	0.0	40.0	0.0	0.0	40.0	0.0	0.0	0.0	0.0
3PN			2000	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
3PN			2001	5	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	40.0	0.0	0.0	40.0	0.0	0.0	0.0
3PN			2002	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN	1998	176	1998	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN			1999	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN			2000	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0
3PN			2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3PN	1999	1955	1999	85	1.2	0.0	0.0	0.0	1.2	0.0	12.9	80.0	2.4	2.4	0.0	0.0	0.0	0.0	0.0
3PN			2000	91	0.0	0.0	0.0	0.0	1.1	0.0	7.7	33.0	17.6	8.8	16.5	7.7	6.6	1.1	0.0
3PN			2001	91	0.0	0.0	0.0	0.0	0.0	0.0	2.2	52.7	13.2	11.0	7.7	8.8	4.4	0.0	0.0
3PN			2002	33	0.0	0.0	0.0	0.0	3.0	0.0	0.0	39.4	18.2	6.1	15.2	6.1	12.1	0.0	0.0
3PN	2000	2898	2000	164	0.0	0.0	0.6	0.0	0.6	0.6	9.1	40.2	14.0	15.9	11.6	6.1	1.2	0.0	0.0
3PN			2001	172	0.0	0.0	0.0	0.0	0.6	0.6	3.5	50.6	14.0	14.0	11.0	5.8	0.0	0.0	0.0
3PN			2002	104	0.0	0.0	0.0	0.0	2.9	0.0	3.8	63.5	4.8	8.7	8.7	7.7	0.0	0.0	0.0
3PN			2003	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	33.3	33.3	0.0	0.0	0.0	0.0
3PN	2001	3029	2001	178	0.0	0.0	0.0	0.0	0.0	0.0	3.4	64.6	3.9	12.4	7.3	5.1	3.4	0.0	0.0
3PN			2002	230	0.0	0.0	0.0	0.0	0.9	0.0	0.4	63.9	8.3	9.1	5.7	9.1	2.6	0.0	0.0
3PN			2003	15	0.0	0.0	0.0	0.0	6.7	0.0	0.0	73.3	0.0	20.0	0.0	0.0	0.0	0.0	0.0
3PN	2002	3404	2002	315	0.0	0.0	1.3	0.0	0.3	0.0	1.6	75.2	3.8	6.0	6.3	4.1	1.3	0.0	0.0
3PN			2003	44	0.0	0.0	2.3	2.3	0.0	2.3	20.5	54.5	4.5	4.5	9.1	0.0	0.0	0.0	0.0
3PN	2003	1124	2003	13	0.0	0.0	0.0	0.0	0.0	7.7	0.0	30.8	0.0	15.4	30.8	15.4	0.0	0.0	0.0

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Table 12. Distribution of recaptures of tagged cod (cont'd.).

Release area	Release year	Number tagged	Recap. year	Number recaptured	Percent recaptured													
					2J3KL	3Psg/h	3Psd	3Pse/f	3Psc	3Psb	3Psa	3Pn	4Rd	4Rc	4Rb	4Ra	4Svwy	4TVn	Unk
4RD	1996	715	1996	9	0.0	0.0	11.1	0.0	0.0	0.0	0.0	22.2	66.7	0.0	0.0	0.0	0.0	0.0	0.0
4RD			1997	25	0.0	0.0	0.0	0.0	12.0	0.0	0.0	40.0	32.0	8.0	0.0	8.0	0.0	0.0	0.0
4RD			1998	29	0.0	0.0	0.0	0.0	17.2	6.9	0.0	20.7	34.5	13.8	6.9	0.0	0.0	0.0	0.0
4RD			1999	11	18.2	0.0	9.1	0.0	0.0	0.0	0.0	36.4	18.2	0.0	18.2	0.0	0.0	0.0	0.0
4RD			2000	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
4RD			2001	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	50.0	0.0	0.0	25.0	0.0	0.0	0.0
4RD			2002	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	66.7	0.0	0.0	0.0	0.0	0.0
4RD	1999	190	1999	8	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4RD			2000	5	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	40.0	0.0	0.0	0.0	40.0	0.0	0.0
4RD			2001	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0	0.0	0.0	0.0	0.0
4RD	2000	605	2000	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	33.3	50.0	0.0	0.0	0.0	0.0	0.0
4RD			2001	62	0.0	0.0	0.0	0.0	1.6	0.0	1.6	4.8	56.5	21.0	9.7	4.8	0.0	0.0	0.0
4RD			2002	24	0.0	0.0	4.2	0.0	0.0	0.0	0.0	33.3	37.5	25.0	0.0	0.0	0.0	0.0	0.0
4RD			2003	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
4RD	2001	465	2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
4RD			2002	34	0.0	0.0	2.9	0.0	0.0	0.0	0.0	26.5	47.1	5.9	5.9	5.9	5.9	0.0	0.0
4RD			2003	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
4RD	2002	173	2002	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4RD	2003	189	2003	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

cont'd.-

Table 12. Distribution of recaptures of tagged cod (cont'd.).

Release area	Release year	Number tagged	Recap. year	Number recaptured	Percent recaptured													
					2J3KL	3Psg/h	3Psd	3Pse/f	3Psc	3Psb	3Psa	3Pn	4Rd	4Rc	4Rb	4Ra	4Svwy	4TVn	Unk
4RC	1995	549	1995	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4RC			1996	26	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	7.7	88.5	0.0	0.0	0.0	0.0	0.0
4RC			1997	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.2	11.1	55.6	11.1	0.0	0.0	0.0	0.0
4RC			1998	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
4RC			1999	3	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	66.7	0.0	0.0	0.0	0.0	0.0
4RC	1996	913	1996	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.3	0.0	86.7	0.0	0.0	0.0	0.0	0.0
4RC			1997	29	0.0	0.0	3.4	0.0	0.0	3.4	0.0	44.8	6.9	41.4	0.0	0.0	0.0	0.0	0.0
4RC			1998	29	0.0	0.0	0.0	3.4	6.9	6.9	0.0	27.6	6.9	34.5	13.8	0.0	0.0	0.0	0.0
4RC			1999	9	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	22.2	22.2	0.0	0.0	22.2	0.0	0.0
4RC			2000	9	0.0	0.0	0.0	0.0	0.0	0.0	11.1	22.2	0.0	66.7	0.0	0.0	0.0	0.0	0.0
4RC			2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RC			2002	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	0.0	33.3	0.0	0.0	0.0	0.0	0.0
4RC	1997	486	1997	27	0.0	0.0	0.0	0.0	3.7	0.0	3.7	14.8	7.4	48.1	22.2	0.0	0.0	0.0	0.0
4RC			1998	20	0.0	0.0	0.0	0.0	10.0	0.0	10.0	0.0	30.0	10.0	20.0	10.0	10.0	0.0	0.0
4RC			1999	22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	18.2	36.4	27.3	9.1	0.0	0.0	0.0
4RC			2000	9	0.0	0.0	0.0	0.0	11.1	0.0	0.0	22.2	0.0	66.7	0.0	0.0	0.0	0.0	0.0
4RC			2001	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	40.0	40.0	0.0	0.0	0.0	0.0
4RC			2002	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4RC	1999	981	1999	48	0.0	0.0	0.0	0.0	2.1	0.0	10.4	25.0	12.5	33.3	16.7	0.0	0.0	0.0	0.0
4RC			2000	61	0.0	0.0	0.0	0.0	1.6	0.0	4.9	11.5	18.0	50.8	9.8	0.0	3.3	0.0	0.0
4RC			2001	33	0.0	0.0	0.0	0.0	0.0	0.0	9.1	27.3	24.2	24.2	15.2	0.0	0.0	0.0	0.0
4RC			2002	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.7	0.0	13.3	26.7	0.0	13.3	0.0	0.0
4RC			2003	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
4RC	2000	613	2000	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	20.0	30.0	0.0	10.0	0.0	0.0	0.0
4RC			2001	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0	13.3	33.3	16.7	6.7	0.0	0.0	0.0
4RC			2002	23	0.0	0.0	0.0	0.0	0.0	0.0	4.3	17.4	8.7	60.9	8.7	0.0	0.0	0.0	0.0
4RC			2003	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
4RC	2001	354	2001	9	0.0	0.0	0.0	0.0	0.0	0.0	11.1	55.6	22.2	0.0	11.1	0.0	0.0	0.0	0.0
4RC			2002	29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.2	0.0	82.8	0.0	0.0	0.0	0.0	0.0
4RC	2002	450	2002	49	0.0	0.0	4.1	0.0	0.0	0.0	2.0	57.1	8.2	16.3	12.2	0.0	0.0	0.0	0.0
4RC			2003	7	0.0	0.0	0.0	0.0	0.0	0.0	14.3	28.6	0.0	28.6	28.6	0.0	0.0	0.0	0.0

cont'd.-

Table 12. Distribution of recaptures of tagged cod (cont'd.).

Release area	Release year	Number tagged	Recap. year	Number recaptured	Percent recaptured													
					2J3KL	3Psg/h	3Psd	3Pse/f	3Psc	3Psb	3Psa	3Pn	4Rd	4Rc	4Rb	4Ra	4Svwy	4TVn	Unk
4RD	1996	715	1996	9	0.0	0.0	11.1	0.0	0.0	0.0	0.0	22.2	66.7	0.0	0.0	0.0	0.0	0.0	0.0
4RD			1997	25	0.0	0.0	0.0	0.0	12.0	0.0	0.0	40.0	32.0	8.0	0.0	8.0	0.0	0.0	0.0
4RD			1998	29	0.0	0.0	0.0	0.0	17.2	6.9	0.0	20.7	34.5	13.8	6.9	0.0	0.0	0.0	0.0
4RD			1999	11	18.2	0.0	9.1	0.0	0.0	0.0	0.0	36.4	18.2	0.0	18.2	0.0	0.0	0.0	0.0
4RD			2000	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
4RD			2001	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	50.0	0.0	0.0	25.0	0.0	0.0	0.0
4RD			2002	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	66.7	0.0	0.0	0.0	0.0	0.0
4RD	1999	190	1999	8	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4RD			2000	5	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	40.0	0.0	0.0	0.0	40.0	0.0	0.0
4RD			2001	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0	0.0	0.0	0.0	0.0
4RD	2000	605	2000	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	33.3	50.0	0.0	0.0	0.0	0.0	0.0
4RD			2001	62	0.0	0.0	0.0	0.0	1.6	0.0	1.6	4.8	56.5	21.0	9.7	4.8	0.0	0.0	0.0
4RD			2002	24	0.0	0.0	4.2	0.0	0.0	0.0	0.0	33.3	37.5	25.0	0.0	0.0	0.0	0.0	0.0
4RD			2003	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
4RD	2001	465	2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
4RD			2002	34	0.0	0.0	2.9	0.0	0.0	0.0	0.0	26.5	47.1	5.9	5.9	5.9	5.9	0.0	0.0
4RD			2003	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
4RD	2002	173	2002	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4RD	2003	189	2003	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

cont'd.-

Table 12. Distribution of recaptures of tagged cod (cont'd.).

Release area	Release year	Number tagged	Recap. year	Number recaptured	Percent recaptured													
					2J3KL	3Psg/h	3Psd	3Pse/f	3Psc	3Psb	3Psa	3Pn	4Rd	4Rc	4Rb	4Ra	4Svwy	4TVn	Unk
4RC	1995	549	1995	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4RC			1996	26	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	7.7	88.5	0.0	0.0	0.0	0.0	0.0
4RC			1997	18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.2	11.1	55.6	11.1	0.0	0.0	0.0	0.0
4RC			1998	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
4RC			1999	3	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	66.7	0.0	0.0	0.0	0.0	0.0
4RC	1996	913	1996	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.3	0.0	86.7	0.0	0.0	0.0	0.0	0.0
4RC			1997	29	0.0	0.0	3.4	0.0	0.0	3.4	0.0	44.8	6.9	41.4	0.0	0.0	0.0	0.0	0.0
4RC			1998	29	0.0	0.0	0.0	3.4	6.9	6.9	0.0	27.6	6.9	34.5	13.8	0.0	0.0	0.0	0.0
4RC			1999	9	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	22.2	22.2	0.0	0.0	22.2	0.0	0.0
4RC			2000	9	0.0	0.0	0.0	0.0	0.0	0.0	11.1	22.2	0.0	66.7	0.0	0.0	0.0	0.0	0.0
4RC			2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RC			2002	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	0.0	33.3	0.0	0.0	0.0	0.0	0.0
4RC	1997	486	1997	27	0.0	0.0	0.0	0.0	3.7	0.0	3.7	14.8	7.4	48.1	22.2	0.0	0.0	0.0	0.0
4RC			1998	20	0.0	0.0	0.0	0.0	10.0	0.0	10.0	0.0	30.0	10.0	20.0	10.0	10.0	0.0	0.0
4RC			1999	22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	18.2	36.4	27.3	9.1	0.0	0.0	0.0
4RC			2000	9	0.0	0.0	0.0	0.0	11.1	0.0	0.0	22.2	0.0	66.7	0.0	0.0	0.0	0.0	0.0
4RC			2001	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	40.0	40.0	0.0	0.0	0.0	0.0
4RC			2002	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4RC	1999	981	1999	48	0.0	0.0	0.0	0.0	2.1	0.0	10.4	25.0	12.5	33.3	16.7	0.0	0.0	0.0	0.0
4RC			2000	61	0.0	0.0	0.0	0.0	1.6	0.0	4.9	11.5	18.0	50.8	9.8	0.0	3.3	0.0	0.0
4RC			2001	33	0.0	0.0	0.0	0.0	0.0	0.0	9.1	27.3	24.2	24.2	15.2	0.0	0.0	0.0	0.0
4RC			2002	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.7	0.0	13.3	26.7	0.0	13.3	0.0	0.0
4RC			2003	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
4RC	2000	613	2000	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	20.0	30.0	0.0	10.0	0.0	0.0	0.0
4RC			2001	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0	13.3	33.3	16.7	6.7	0.0	0.0	0.0
4RC			2002	23	0.0	0.0	0.0	0.0	0.0	0.0	4.3	17.4	8.7	60.9	8.7	0.0	0.0	0.0	0.0
4RC			2003	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
4RC	2001	354	2001	9	0.0	0.0	0.0	0.0	0.0	0.0	11.1	55.6	22.2	0.0	11.1	0.0	0.0	0.0	0.0
4RC			2002	29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.2	0.0	82.8	0.0	0.0	0.0	0.0	0.0
4RC	2002	450	2002	49	0.0	0.0	4.1	0.0	0.0	0.0	2.0	57.1	8.2	16.3	12.2	0.0	0.0	0.0	0.0
4RC			2003	7	0.0	0.0	0.0	0.0	0.0	0.0	14.3	28.6	0.0	28.6	28.6	0.0	0.0	0.0	0.0

cont'd.-

Table 12. Distribution of recaptures of tagged cod (cont'd.).

Release area	Release year	Number tagged	Recap. year	Number recaptured	Percent recaptured														
					2J3KL	3Psg/h	3Psd	3Pse/f	3Psc	3Psb	3Psa	3Pn	4Rd	4Rc	4Rb	4Ra	4Svwy	4TVn	Unk
4RB	1995	130	1995	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4RB			1997	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4RB			1998	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RB			2000	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
4RB	1996	1148	1996	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RB			1997	19	0.0	0.0	0.0	0.0	5.3	0.0	0.0	42.1	0.0	0.0	21.1	21.1	10.5	0.0	0.0
4RB			1998	24	0.0	0.0	0.0	0.0	8.3	0.0	0.0	8.3	0.0	8.3	75.0	0.0	0.0	0.0	0.0
4RB			1999	31	3.2	0.0	3.2	0.0	3.2	0.0	3.2	0.0	0.0	0.0	67.7	12.9	6.5	0.0	0.0
4RB			2000	7	0.0	0.0	0.0	0.0	14.3	0.0	0.0	28.6	28.6	28.6	0.0	0.0	0.0	0.0	0.0
4RB			2001	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RB			2002	3	0.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	66.7	0.0	0.0	0.0	0.0
4RB	1997	277	1997	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4RB			1999	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.0	25.0	0.0	0.0	0.0
4RB			2000	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4RB			2001	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0
4RB			2002	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RB	1999	707	1999	15	0.0	0.0	6.7	0.0	0.0	0.0	20.0	26.7	0.0	13.3	20.0	13.3	0.0	0.0	0.0
4RB			2000	43	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.6	4.7	9.3	39.5	23.3	4.7	0.0	0.0
4RB			2001	11	0.0	0.0	0.0	0.0	0.0	0.0	9.1	18.2	0.0	0.0	54.5	18.2	0.0	0.0	0.0
4RB			2002	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	50.0	16.7	16.7	0.0	0.0
4RB	2000	718	2000	9	0.0	0.0	0.0	0.0	0.0	0.0	11.1	0.0	0.0	11.1	77.8	0.0	0.0	0.0	0.0
4RB			2001	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	81.0	9.5	9.5	0.0	0.0
4RB			2002	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0	23.1	50.0	19.2	0.0	0.0	0.0
4RB	2001	502	2001	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.2	0.0	0.0	77.8	0.0	0.0	0.0	0.0
4RB			2002	33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	81.8	6.1	6.1	0.0	0.0
4RB			2003	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RB	2002	182	2002	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.3	0.0	0.0	76.7	0.0	0.0	0.0	0.0
4RB			2003	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0

cont'd.-

Table 12. Distribution of recaptures of tagged cod (cont'd.).

Release area	Release year	Number tagged	Recap. year	Number recaptured	Percent recaptured														
					2J3KL	3Psg/h	3Psd	3Pse/f	3Psc	3Psb	3Psa	3Pn	4Rd	4Rc	4Rb	4Ra	4Svwy	4TVn	Unk
4RA			1997	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4RA			1998	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4RA			2000	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4RA			2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4RA	1996	2558	1996	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4RA			1997	22	0.0	0.0	4.5	0.0	0.0	4.5	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0
4RA			1998	22	0.0	0.0	0.0	0.0	0.0	0.0	9.1	9.1	0.0	0.0	27.3	22.7	31.8	0.0	0.0
4RA			1999	13	0.0	0.0	7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92.3	0.0	0.0	0.0
4RA			2000	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	33.3	0.0	33.3	16.7	0.0	0.0
4RA			2001	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	66.7	0.0	0.0	0.0
4RA			2002	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	33.3	0.0	0.0	33.3	0.0	0.0
4RA	1997	860	1997	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
4RA			1998	10	0.0	0.0	0.0	0.0	20.0	0.0	0.0	20.0	0.0	0.0	0.0	20.0	40.0	0.0	0.0
4RA			1999	9	0.0	0.0	0.0	0.0	0.0	11.1	0.0	0.0	0.0	22.2	22.2	44.4	0.0	0.0	0.0
4RA			2000	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0
4RA			2002	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RA			2003	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RA	1998	299	1998	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
4RA			1999	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4RA			2000	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0
4RA			2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RA			2002	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	66.7	0.0	0.0
4RA	1999	1295	1999	55	1.8	0.0	0.0	0.0	0.0	0.0	7.3	3.6	0.0	0.0	20.0	61.8	5.5	0.0	0.0
4RA			2000	39	0.0	0.0	0.0	0.0	0.0	0.0	2.6	5.1	15.4	0.0	15.4	46.2	15.4	0.0	0.0
4RA			2001	31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.9	12.9	0.0	25.8	41.9	6.5	0.0	0.0
4RA			2002	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	16.7	0.0	0.0	50.0	16.7	0.0	0.0
4RA	2000	1437	2000	27	0.0	0.0	0.0	0.0	3.7	0.0	3.7	0.0	14.8	0.0	7.4	55.6	14.8	0.0	0.0
4RA			2001	42	2.4	0.0	0.0	0.0	0.0	0.0	2.4	23.8	11.9	9.5	14.3	26.2	9.5	0.0	0.0
4RA			2002	31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.3	0.0	0.0	0.0	41.9	25.8	0.0	0.0
4RA			2003	5	0.0	0.0	0.0	0.0	0.0	0.0	60.0	0.0	0.0	0.0	40.0	0.0	0.0	0.0	0.0
4RA	2001	2335	2001	33	0.0	0.0	0.0	0.0	0.0	3.0	3.0	24.2	0.0	6.1	6.1	33.3	24.2	0.0	0.0
4RA			2002	50	0.0	0.0	2.0	0.0	0.0	0.0	2.0	34.0	0.0	0.0	10.0	26.0	26.0	0.0	0.0
4RA			2003	7	0.0	0.0	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.7	0.0	0.0
4RA	2002	658	2002	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	33.3	0.0	0.0	0.0	33.3	0.0	0.0

cont'd.-

Table 12. Distribution of recaptures of tagged cod (cont'd.).

Release area	Release year	Number tagged	Recap. year	Number recaptured	Percent recaptured													
					2J3KL	3Psg/h	3Psd	3Pse/f	3Psc	3Psb	3Psa	3Pn	4Rd	4Rc	4Rb	4Ra	4Svwy	4TVn	Unk
4RB	1995	130	1995	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4RB			1997	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4RB			1998	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RB			2000	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
4RB	1996	1148	1996	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RB			1997	19	0.0	0.0	0.0	0.0	5.3	0.0	0.0	42.1	0.0	0.0	21.1	21.1	10.5	0.0	0.0
4RB			1998	24	0.0	0.0	0.0	0.0	8.3	0.0	0.0	8.3	0.0	8.3	75.0	0.0	0.0	0.0	0.0
4RB			1999	31	3.2	0.0	3.2	0.0	3.2	0.0	3.2	0.0	0.0	0.0	67.7	12.9	6.5	0.0	0.0
4RB			2000	7	0.0	0.0	0.0	0.0	14.3	0.0	0.0	28.6	28.6	28.6	0.0	0.0	0.0	0.0	0.0
4RB			2001	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RB			2002	3	0.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	66.7	0.0	0.0	0.0	0.0
4RB	1997	277	1997	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4RB			1999	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.0	25.0	0.0	0.0	0.0
4RB			2000	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4RB			2001	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0
4RB			2002	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RB	1999	707	1999	15	0.0	0.0	6.7	0.0	0.0	0.0	20.0	26.7	0.0	13.3	20.0	13.3	0.0	0.0	0.0
4RB			2000	43	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.6	4.7	9.3	39.5	23.3	4.7	0.0	0.0
4RB			2001	11	0.0	0.0	0.0	0.0	0.0	0.0	9.1	18.2	0.0	0.0	54.5	18.2	0.0	0.0	0.0
4RB			2002	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	50.0	16.7	16.7	0.0	0.0
4RB	2000	718	2000	9	0.0	0.0	0.0	0.0	0.0	0.0	11.1	0.0	0.0	11.1	77.8	0.0	0.0	0.0	0.0
4RB			2001	21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	81.0	9.5	9.5	0.0	0.0
4RB			2002	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	0.0	23.1	50.0	19.2	0.0	0.0	0.0
4RB	2001	502	2001	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.2	0.0	0.0	77.8	0.0	0.0	0.0	0.0
4RB			2002	33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	81.8	6.1	6.1	0.0	0.0
4RB			2003	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RB	2002	182	2002	30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.3	0.0	0.0	76.7	0.0	0.0	0.0	0.0
4RB			2003	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0

cont'd.-

Table 12. Distribution of recaptures of tagged cod (cont'd.).

Release area	Release year	Number tagged	Recap. year	Number recaptured	Percent recaptured													
					2J3KL	3Psg/h	3Psd	3Pse/f	3Psc	3Psb	3Psa	3Pn	4Rd	4Rc	4Rb	4Ra	4Svwy	4TVn	Unk
4RA			1997	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4RA			1998	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4RA			2000	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4RA			2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4RA	1996	2558	1996	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0
4RA			1997	22	0.0	0.0	4.5	0.0	0.0	4.5	0.0	0.0	0.0	0.0	9.1	45.5	36.4	0.0	0.0
4RA			1998	22	0.0	0.0	0.0	0.0	0.0	0.0	9.1	9.1	0.0	0.0	27.3	22.7	31.8	0.0	0.0
4RA			1999	13	0.0	0.0	7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92.3	0.0	0.0	0.0
4RA			2000	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	33.3	0.0	33.3	16.7	0.0	0.0
4RA			2001	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	66.7	0.0	0.0	0.0
4RA			2002	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	33.3	0.0	0.0	33.3	0.0	0.0
4RA	1997	860	1997	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
4RA			1998	10	0.0	0.0	0.0	0.0	20.0	0.0	0.0	20.0	0.0	0.0	0.0	20.0	40.0	0.0	0.0
4RA			1999	9	0.0	0.0	0.0	0.0	0.0	11.1	0.0	0.0	0.0	22.2	22.2	44.4	0.0	0.0	0.0
4RA			2000	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0
4RA			2002	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RA			2003	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RA	1998	299	1998	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
4RA			1999	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4RA			2000	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0
4RA			2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4RA			2002	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	66.7	0.0	0.0
4RA	1999	1295	1999	55	1.8	0.0	0.0	0.0	0.0	0.0	7.3	3.6	0.0	0.0	20.0	61.8	5.5	0.0	0.0
4RA			2000	39	0.0	0.0	0.0	0.0	0.0	0.0	2.6	5.1	15.4	0.0	15.4	46.2	15.4	0.0	0.0
4RA			2001	31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.9	12.9	0.0	25.8	41.9	6.5	0.0	0.0
4RA			2002	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	16.7	0.0	0.0	50.0	16.7	0.0	0.0
4RA	2000	1437	2000	27	0.0	0.0	0.0	0.0	3.7	0.0	3.7	0.0	14.8	0.0	7.4	55.6	14.8	0.0	0.0
4RA			2001	42	2.4	0.0	0.0	0.0	0.0	0.0	2.4	23.8	11.9	9.5	14.3	26.2	9.5	0.0	0.0
4RA			2002	31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.3	0.0	0.0	0.0	41.9	25.8	0.0	0.0
4RA			2003	5	0.0	0.0	0.0	0.0	0.0	0.0	60.0	0.0	0.0	0.0	40.0	0.0	0.0	0.0	0.0
4RA	2001	2335	2001	33	0.0	0.0	0.0	0.0	0.0	3.0	3.0	24.2	0.0	6.1	6.1	33.3	24.2	0.0	0.0
4RA			2002	50	0.0	0.0	2.0	0.0	0.0	0.0	2.0	34.0	0.0	0.0	10.0	26.0	26.0	0.0	0.0
4RA			2003	7	0.0	0.0	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.7	0.0	0.0
4RA	2002	658	2002	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	33.3	0.0	0.0	0.0	33.3	0.0	0.0

cont'd.-

Table 12. Distribution of recaptures of tagged cod (cont'd.).

Release area	Release year	Number tagged	Recap. year	Number recaptured	Percent recaptured													
					2J3KL	3Psg/h	3Psd	3Pse/f	3Psc	3Psb	3Psa	3Pn	4Rd	4Rc	4Rb	4Ra	4Svwy	4TVn	Unk
4SV	1996	24	1996	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SV	1997	19	1997	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SV	1998	14	1998	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SV	1999	17	1999	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SV	2000	16	2000	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SW	1996	1109	1996	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SW			1997	17	0.0	0.0	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	58.8	35.3	0.0	0.0
4SW			1998	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	20.0	60.0	0.0	0.0
4SW			1999	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0	40.0	0.0	0.0
4SW			2001	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	50.0	16.7	0.0	0.0
4SW			2002	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4SW	1997	826	1997	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0
4SW			1998	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	80.0	0.0	0.0	0.0
4SW			1999	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.0	50.0	5.0	0.0
4SW			2000	11	18.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.2	0.0	0.0	63.6	0.0	0.0	0.0
4SW			2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SW	1998	1967	1998	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
4SW			1999	22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	0.0	0.0	18.2	45.5	27.3	0.0	0.0
4SW			2000	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.4	34.6	0.0	0.0
4SW			2001	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	0.0	8.0	16.0	28.0	40.0	0.0	0.0
4SW			2002	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	66.7	0.0	0.0
4SW	1999	1016	1999	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	60.0	0.0	0.0	0.0
4SW			2000	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0
4SW			2001	7	0.0	0.0	0.0	0.0	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0	85.7	0.0	0.0
4SW			2002	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	60.0	20.0	0.0	0.0
4SW	2000	768	2000	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SW			2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4SW			2002	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	66.7	0.0	0.0
4SW	2001	257	2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
4SW	2002	601	2002	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SW			2003	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
4SY	1997	18	1997	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SY	1998	344	1998	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SY	1999	178	1999	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 12. Distribution of recaptures of tagged cod (cont'd.).

Release area	Release year	Number tagged	Recap. year	Number recaptured	Percent recaptured														
					2J3KL	3Psg/h	3Psd	3Pse/f	3Psc	3Psb	3Psa	3Pn	4Rd	4Rc	4Rb	4Ra	4Svwy	4TVn	Unk
4SV	1996	24	1996	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SV	1997	19	1997	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SV	1998	14	1998	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SV	1999	17	1999	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SV	2000	16	2000	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SW	1996	1109	1996	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SW			1997	17	0.0	0.0	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	58.8	35.3	0.0	0.0
4SW			1998	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	20.0	60.0	0.0	0.0
4SW			1999	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0	40.0	0.0	0.0
4SW			2001	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	50.0	16.7	0.0	0.0
4SW			2002	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
4SW	1997	826	1997	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0
4SW			1998	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	80.0	0.0	0.0	0.0
4SW			1999	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.0	50.0	5.0	0.0
4SW			2000	11	18.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.2	0.0	0.0	63.6	0.0	0.0	0.0
4SW			2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SW	1998	1967	1998	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
4SW			1999	22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	0.0	0.0	18.2	45.5	27.3	0.0	0.0
4SW			2000	26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.4	34.6	0.0	0.0
4SW			2001	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	0.0	8.0	16.0	28.0	40.0	0.0	0.0
4SW			2002	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	66.7	0.0	0.0
4SW	1999	1016	1999	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	60.0	0.0	0.0	0.0
4SW			2000	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0
4SW			2001	7	0.0	0.0	0.0	0.0	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0	85.7	0.0	0.0
4SW			2002	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	60.0	20.0	0.0	0.0
4SW	2000	768	2000	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SW			2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
4SW			2002	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	66.7	0.0	0.0
4SW	2001	257	2001	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
4SW	2002	601	2002	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SW			2003	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
4SY	1997	18	1997	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SY	1998	344	1998	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4SY	1999	178	1999	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

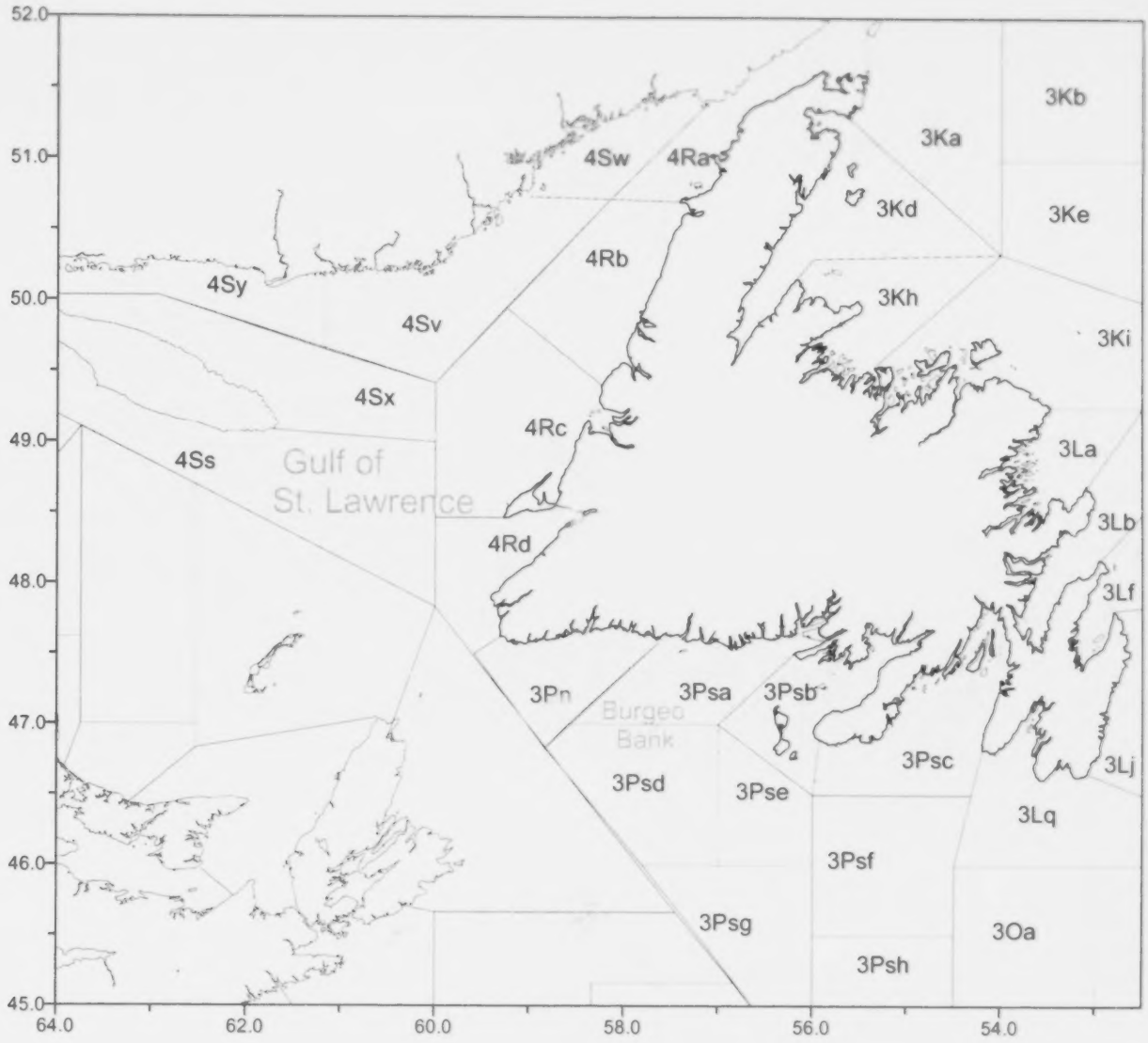

Fig. 1. Names and boundaries of NAFO statistical areas in the northern Gulf of St. Lawrence and off insular Newfoundland. Dashed line is the boundary of the French economic zone; grey line is the 200 m depth contour.

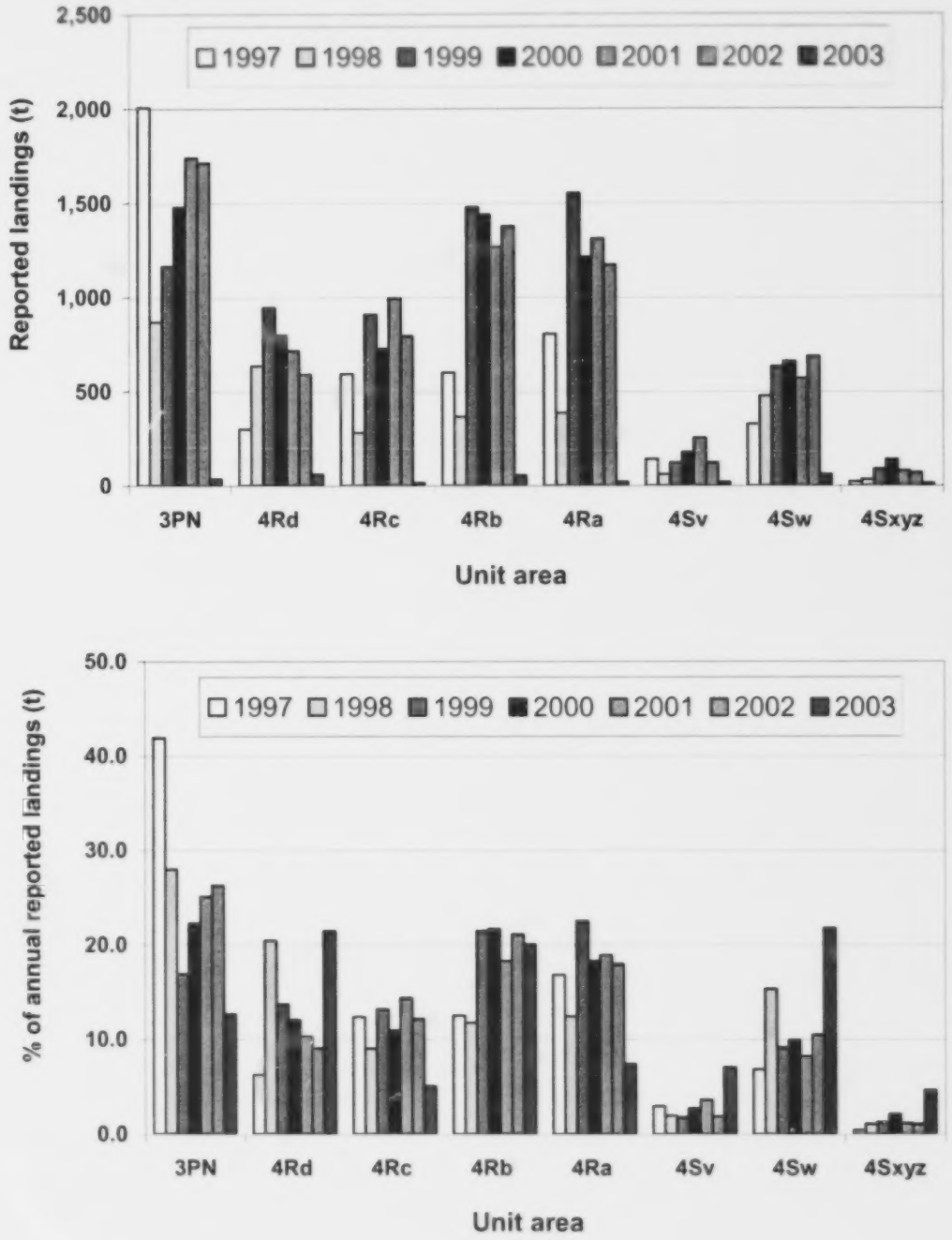

Fig. 2. Annual reported landings of cod from NAFO Divs. 3Pn4RS by unit area during 1997-2003.

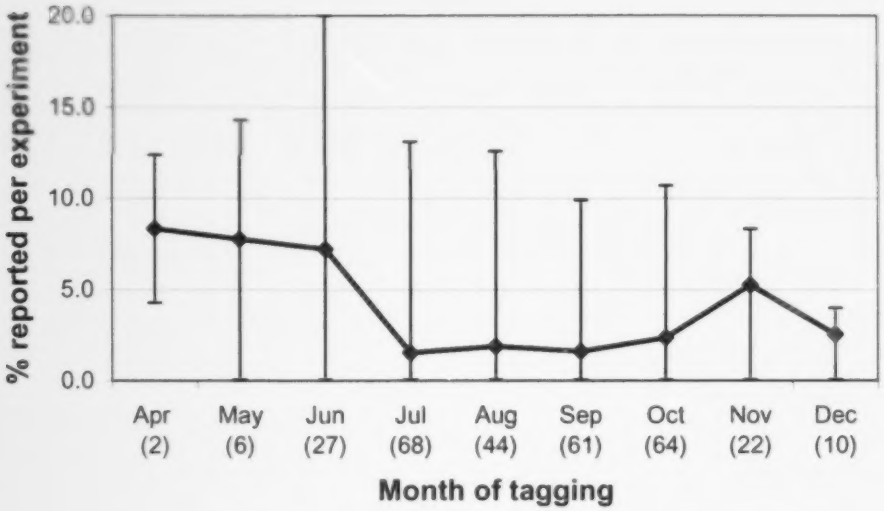

Fig. 3. Median percentage of tagged cod reported as recaptured per experiment (with 10th & 90th percentiles) by month of release for cod tagged in 3Pn4RS during 1995-2003. Values in parentheses are numbers of tagging experiments.

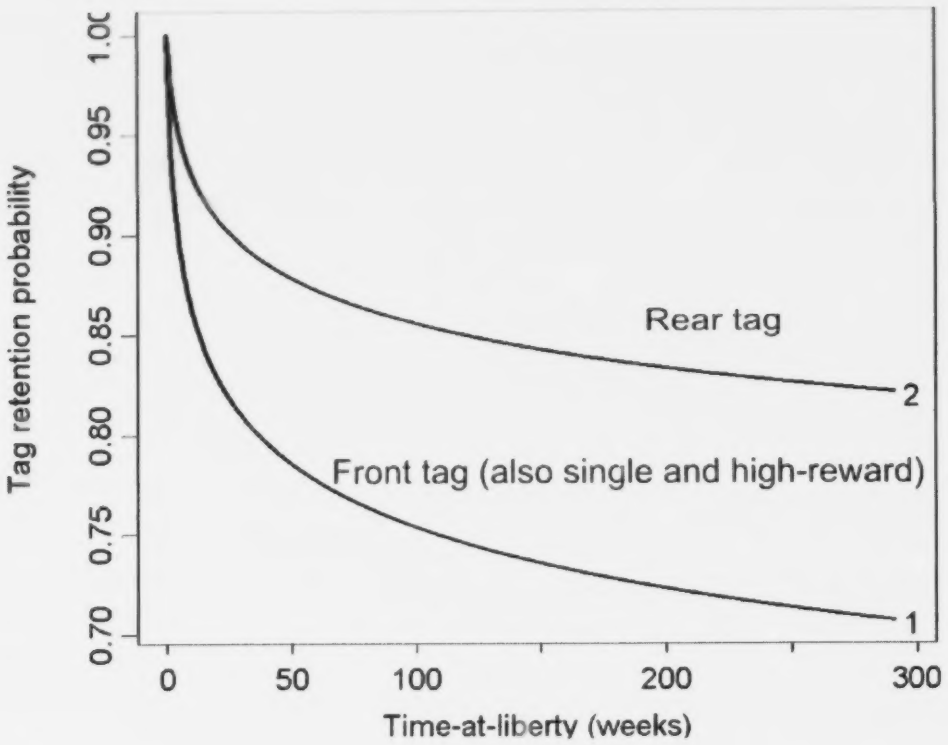

Fig. 4. Tag retention rates for cod tagged with single and double t-bar anchor tags, based on reported recaptures of about 2,670 initially double-tagged fish from 11,158 double-tag releases in 3Ps/3KL during 1997-2002 (from Cadigan and Brattey 2003).